

Arboretum BULLETIN

A JOURNAL OF GENERAL HORTICULTURAL INFORMATION
PUBLISHED QUARTERLY BY THE UNIVERSITY OF WASHINGTON
ARBORETUM FOUNDATION • SEATTLE WASHINGTON


Winter 1952
VOLUME XV, NO. 4

* * *

TABLE OF CONTENTS

The Arboretum in Early Fall.....	B. O. Mulligan	1
Botanists of the Pacific Railroad Surveys.....	Gladys R. Boughton	3
Rare and Useful Plants from the Siskiyou.....	Mrs. Harry O. Smith	6
Alaska Cedar.....	C. Frank Brockman	8
Arboretum Spotlight		10

Hollies

Hollies of the Southeastern States.....	H. Harold Hume	11
Two Hollies at Wisley.....	Robert Adams	15
A Holly Problem.....	Harry E. Nelson	16
Hollies in the Arboretum.....	B. O. Mulligan	17
Diseases of Holly in the Pacific Northwest.....	Roy A. Young and I. W. Deep	18
Germination of Holly Seeds at the Arboretum.....	B. O. Mulligan and L. J. Michaud	19
The Propagation of American and English Holly for the Amateur.....	Henry M. Biekart	20
		
Notes and Comment.....		22
Arboretum Notebook		24
Book Reviews.....		27
Index to Volume XV		31



wonderful, practical
GIFT IDEA



Beauty Barrow[®]

... the barrow that becomes a barbecue!



Here is a new, original gift idea!

The Beauty Barrow garden cart has scores of uses around the home and comes equipped with big puncture-proof tire. It sells for **14.95**.

But see what the tray and grille do! They make your Beauty Barrow into a barbecue cart at an additional cost of only 4.95.

11 Convenient Stores

ERNST HARDWARE CO.

SEATTLE • NORTHGATE • BELLEVUE



The Arboretum Bulletin

VOLUME XV

WINTER, 1952

NUMBER 4

The Arboretum in Early Fall

B. O. MULLIGAN

PERHAPS the most unusual feature of the late summer and early fall in the Arboretum has been the abnormally dry and sunny weather, continuing to a much later date than usual. September was the warmest and driest (for that month) recorded in the city since 1943, with the average temperature 3° above normal. The same type of weather continued during the first three weeks of October and only broke on the 20th, after 41 days without measurable rain; the month's average temperature, 57.2° , was 3.5° above normal, and the sunshine record 18 per cent above; in September it was 17 per cent over the normal. The rainfall in Seattle for the two months totalled 1.04 inches, against an average of 4.61 inches; in the Arboretum, where the amount is usually greater, we received 1.43 inches.

Such weather necessitated watering, especially the broad-leaved evergreen shrubs such as camellias and rhododendrons, but also azaleas, peonies and other plants, to a much later date than usual; during the first ten days of October all evidently dry areas were systematically covered by our sprinkling system, and early in November, although half an inch of rain had fallen during the last few days of October, it became necessary to water newly planted young peonies and hollies—a most unusual occurrence here, to say the least of it.

Of work achieved, one of the most obvious

improvements has been the grading of the old grass area just west of the approach road to the Historical Museum, followed by improvement of the heavy soil by adding sawdust and other materials, then cultivating, and finally raking it before sowing grass seed in mid-October. This is part of the joint scheme of the City Park Department and the Arboretum for the planning and planting of the areas around the Museum building. Planting, to a plan drawn up by Mr. Cash Beardsley, landscape architect for the Department, is now (mid-November) in progress.

Several other areas of various sizes in the Arboretum have also been sown to grass since mid-September. The first is a strip on the east side of the road leading from the Boulevard to the north gate, in front of the oak section; this had previously been growing only weeds since the curb was laid in 1949, and has now been properly graded so that it can be easily mown. The second is the system of principal grass paths through the *Philadelphus* and *Deutzia* collections—across the Upper Road from the magnolias—most of which are twelve feet or more in width. The third is on a filled area over part of a newly laid six-inch tile drain on the east side of the Boulevard, which has greatly improved what had formerly been a very untidy corner, as well as providing a better service road behind the grassed section for our trucks.

Weeding has continued up to the present date, with two or three men working systematically through different areas, including the camellia beds, Rhododendron Glen, peonies, cistus, etc. In mid-September, most grass areas were sprayed with 2-4-D to control broad-leaved weeds. A new bed is being prepared for additional hollies (forms of the English holly) on the bank north of the existing collection, and some pruning of lower branches has been done on trees in the same area, both to give the hollies more light and visitors a better view of these plants. New gateposts had to be erected at the entrance to the Winkenwerder area opposite Miller Street, due to the collapse of the old gate, and considerable work has been done to improve an unsightly and badly drained area on the east side of Azalea Way opposite Boyer Avenue.

Planting

None was possible until October 24th this fall, due of course to the abnormally dry season, and even this date was perhaps a week too early in relation to the rainfall, although half an inch fell between the 28th and 31st.

On the rock garden by the south entrance to the Upper Road we have added twenty kinds of summer flowering heathers (142 plants in all) and to the Winter Garden four kinds (170 plants), including a long border of the white form of *E. darleyensis* and a smaller group of *E. carnea* "Ruby Glow"; these continue the plantings sponsored by the Mercer Island Garden Club.

Eighteen varieties of shrubby peonies, nearly all of Japanese origin, and given to us in 1950 by the Juanita Graham Unit No. 30, have been added to the growing collection of these lovely plants. Along the upper trail on the south side of Rhododendron Glen groups of four more of the smaller sized *Rhododendron* species have been placed, including *R. oleifolium* and *R. sphaeranthum*. Early in November the small assemblage of named forms of the American holly (*Ilex opaca*) in the *Ilex* collection by the Upper Road was augmented by ten more from the nursery and lath houses which, with other male plants for pollination, now completely fill the available

space. Other hollies planted at the same time—many donated to us by the State Conservation Society in 1948 and 1950—include hybrids between *Ilex Pernyi* and *I. cornuta*, *I. Aquifolium* and *I. Pernyi*, and forms of the older hybrid, *I. altaclarensis*, together with the inkberry, *I. glabra*, and the Yaupon (*I. vomitoria*) from the southeastern U. S. A.—in all 45 plants of 38 kinds.

Acquisitions

The most notable was the set of some fifty rare plants received from Great Britain through the good offices of Mr. T. H. Everett, of the New York Botanical Garden, as a result of the scheme sponsored by the Garden Club of America to locate and obtain such plants during the past summer. These have, as usual, passed through the Plant Quarantine inspection and fumigation at Hoboken, New Jersey, and now are receiving the best possible care in the Arboretum propagating house; it is hoped that most of a set of *Escallonia* hybrids from Northern Ireland will be amongst the survivors, as well as certain of the newer English camellia hybrids, a *Hypericum*, *Magnolia officinalis*, *Drimys andina*, a new *Daboecia*, and others which are novelties here.

Thirty-four additional varieties of Glenn Dale azaleas reached us during August from the U. S. D. A. in Maryland; the Arnold Arboretum sent seedlings of seven species of trees not at present represented here, and Mrs. L. N. Roberson of Seattle gave us six kinds of heathers (26 plants), now planted on the rock garden.

Two collections of seeds of Chilean plants have been received during this period; the larger, of 28 species, through the Arnold Arboretum of Boston, for further distribution to other West Coast institutions, the smaller from Dr. T. H. Goodspeed, Botany Department, University of California, Berkeley. Some of the former have already germinated. Thirteen very welcome packets of native tree and shrub seeds arrived from the Department of Scientific and Industrial Research, Wellington, New Zealand; five species of *Ceanothus* from Rancho Santa Ana Botanic Garden at

(Continued on Page Twenty-eight)

Botanists of the Pacific Railroad Surveys

GLADYS R. BOUGHTON *

THE explorations made under the auspices of the War Department in 1853 and 1854 to discover the most favorable route for a railroad from the Mississippi River to the Pacific Coast proved a rich source of information concerning the natural history of the West. Of the five routes explored, the most northerly, lying near the 47th and 49th parallels, is of the greatest interest to students of the botany of the Northwest.

Investigation of this route was entrusted to Governor Isaac Stevens, who provided inspired leadership. As physicians to the exploring parties and collectors of natural history specimens Dr. George Suckley and Dr. James Graham Cooper were important members of the party. Mr. George Gibbs, geologist and ethnologist, assisted considerably in the collecting of plants. Spencer F. Baird, then assistant secretary of the Smithsonian Institution, was official naturalist for the Surveys, and it was to him that specimens were sent; Asa Gray and John Torrey shared the responsibility of examining and naming them.

Dr. Suckley joined the expedition in 1853 as a young man of twenty-two; energetic, ambitious, and desirous of seeing the world. Later in life he achieved considerable recognition in medical circles, but his unique contribution was to the field of natural science through collections made in the Northwest. He was daring and resourceful and easily the most popular member of the party. James Cooper, like Suckley, had graduated from the College of Physicians and Surgeons, where both had been students of Torrey, and had finished a period of residency in a New York hospital. Cooper, in his father's home, had been surrounded by men of science, among whom were Nuttall, Audubon, Torrey and Schoolcraft. The elder

Cooper was the central figure of the group to found the Lyceum of Natural History, forerunner of the New York Academy of Sciences. In his pioneer labors in the field young Cooper was equally fortunate in sharing his rich experiences with such men as Haydn, Gibbs and Asa Gray. In the writing of his reports he came into contact with Spencer Baird, who praised him highly and characterized his work on birds as the most valuable since that of Audubon. He was an indefatigable collector and a naturalist of great skill and perception. To the reports of Suckley and Cooper, George Gibbs made important contributions. Mr. Gibbs had several years earlier forsaken the dull routine of a New York law practice to accompany a contingent of Mounted Rifles to California, then on to Oregon and Washington Territory. Here he established himself near Fort Steilacoom and devoted himself to the study of Indian languages and the collection of vocabularies and traditions of Northwest tribes. He was a cultivated and intellectual man of great personal charm who possessed an astounding fund of knowledge of nature and became thoroughly experienced in the rude struggle for existence under primitive conditions. Each Commission in turn sought eagerly for his services, and he was attached successively to the Railroad Survey and to the Northwest Boundary Commission.

During the years prior to 1850 agitation for a railroad increased. With the discovery of gold in California and peace with Mexico there was a growing sentiment that the railroad should soon be built and that the government should aid in its construction. Authority was given in March, 1853, for explorations and surveys to discover the most practicable and economical route, and in February, 1855, the reports were laid before Congress.

To expedite the Surveys made under his command, Governor Stevens conducted the exploration in two divisions, one starting from the Mississippi River to move west, the other to move east from Puget Sound. A third party

*Miss Gladys R. Boughton, Acting Director of the University of Washington's School of Librarianship, despite her many duties, has found time to devote to two of our articles on "Early Plant Explorers of the Pacific Northwest." (Dr. David Lyall, Summer, 1952). This is the last in our series, which, judging by correspondence received in The Bulletin office, was enjoyed with keen interest by our readers.

established a depot of provisions at St. Mary's village west of the Rocky Mountains, to facilitate winter operations and enable the exploring parties to continue in the field for the longest possible period. This party was to reconnoiter from its permanent base.

The western division was to explore the passes of the Cascade Mountains from the Columbia to the 49th parallel and to meet the eastern division between the Cascades and the Rocky Mountains. Captain George McClellan was placed in charge of this division and Dr. Cooper and Mr. Gibbs were attached to his party. Dr. Suckley travelled with the eastern division under the personal supervision of Stevens. Both parties were of considerable size, made up of engineers, a small military force, scientific corps, hunters and packers.

The general plan of operation was to mark out a base line by the movement of the train on which were to be made observations, and by detached parties to examine important landmarks and side routes covering as much of the country as practicable. All members of the expedition were ordered to acquaint themselves with the purposes and plans of the expedition and, including the scientists, were in turn put in charge of detached parties.

Dr. Suckley has given a vivid account of the side trip assigned to him in the fall of 1853. He had come as far as St. Mary's valley with the main party, collecting along the route. From this point Stevens continued west, leaving orders for Suckley to collect in the area for a few weeks, then proceed by canoe from Ft. Owens down the Bitter Root and St. Mary's Rivers, through by Lake Pend Oreille down Clark's fork of the Columbia and to the mouth of the Cowlitz. Soon after Stevens departed, he learned that the Hudson's Bay people considered the passage of the Columbia from Pend Oreille Mission too dangerous to attempt and sent a runner to warn the young explorer.

Suckley reports that before he could start he had considerable difficulty in making a canoe to serve his purpose. He finally constructed a skin boat out of three bullocks'

hides and embarked with two white men and an Indian to descend the Bitter Root. The people of St. Mary's were entirely unacquainted with the nature of the river and its possibilities for canoe travel, no boats ever having been known to ascend this far. Owing to the hazardous nature of the journey it was necessary to proceed with great caution. Long before the twenty-five days of the journey were over, his provisions had given out, and he was forced to live on camas root, dried berries and fish. The weather turned cold and wet, tents and blankets were soaked. Collecting was difficult under such conditions, but Suckley carried out his instructions to occupy his field as fully as his means would permit and produced a valuable report not only on the natural history of the route but the navigability of the Columbia, the character of its banks, the nature of the Indians, and condition of the missions along the way.

Earlier, important collections were made by Suckley along the eastern portion of the route while he travelled with the main party. A catalogue of these plants has been compiled by Asa Gray and the specimens laid into the National Herbarium. Although these regions had previously been investigated, Suckley's collection includes three undescribed species, and a new genus, *Endolepis* Suckley, as described and named by Torrey, but later merged with *Atriplex*. He is given credit for collecting a rare annual, *Suckleya Suckleyana*, described by Gray. During his second year in the Northwest Suckley collected west of the Cascades, and his contributions are listed with those of Mr. Gibbs in Cooper's report.

Under orders from Captain McClellan of the western division George Gibbs directed several side journeys. One of particular interest was undertaken for the examination of the country lying between Shoalwater Bay and Puget Sound and included a tour of the Sound itself. The principal object of the journey was to explore for a route connecting Shoalwater Bay with the interior. An old Indian trail was said to lead from some point on the Willapah and intersect the road from Cowlitz Farms to Puget Sound. It had been in disuse for many

years since the extinction of the tribe through whose country it ran. The journey was reputed to require two days, but the few Indians who had heard of it were unwilling to venture, representing the trail as overgrown and difficult to follow.

With two white men Gibbs made the attempt, travelled some distance by canoe, then attempted to cross country. After three days during which he travelled only fifteen miles, he found the trail but abandoned the journey because of heavy rains. After passing beyond the tide-lands and open prairies he found in the vine-maple bottom lands a growth so dense and tangled that passage was impossible. From the tops of the few hills overlooking the level lands he made what examination he could of the surrounding country. Gibbs judged that there would be few tracts of equal extent in Washington Territory of as good quality for farming.

In his tour of the Sound he collected a wealth of information about the waters and the surrounding country. He described the gravelly prairies at the head of the Sound and stopped to examine the much-discussed mounds occurring in this region ascribed by Wilkes as of artificial origin. Gibbs advanced the opinion that they had been formed by the protection afforded by vegetation—brushes, roots or grass—to the particular spots constituting their summits while adjacent soil had been washed away. In a later report, Gibbs came into agreement with Cooper that the mounds were more likely to have been caused by eddies or whirlpools when these prairies lay at the bottom of a body of water.

The contributions of the three naturalists are brought together by Dr. Cooper in his *Report on the Botany of the Route*, in which a concise and systematic account is given of the botanical regions encountered and the zonal distribution of plants. Cooper had accompanied the party charged with the duty of exploring the passes of the Cascade Mountains from the Columbia River to the northern parallel and pushing eastward to meet the eastern division between the Cascades and the Rocky Mountains. He calls attention to

the limited time of the Survey and the extent of country traversed, but he succeeded in making extensive collections of great interest and in collecting data for defining satisfactorily the limits of the various regions and their particular products. Like other naturalists who have traveled the Northwest, he is impressed by the great variety of distinct regions and the marked differences between the eastern and western slopes of the Cascades. In his *Catalogue of Plants Collected in Washington Territory* he lists separately the plants collected on opposite sides of the mountains to show the contrast in the floras of the two regions. He is given credit for collecting an undescribed *Astragalus* and *Malacothrix crepoides*.

Cooper eventually returned to Puget Sound, where he, too, spent considerable time around Shoalwater Bay. After the Railroad Survey was completed, Suckley returned to the coast where he was attached as surgeon to the post at Ft. Steilacoom. Here he renewed many of his previous collections and added considerably to his list of species.

To Cooper and Suckley we are indebted for a knowledge of the entire natural history of the coast regions of northern Oregon and Washington, such as is possessed by few states. In 1865, after the completion of the labors of these men, Spencer Baird of the Smithsonian Institution wrote that it is questionable whether species of plants and animals of the Atlantic coast are as well known as those of the Pacific slope, largely through the efforts of Dr. Cooper, Dr. Suckley and Mr. Gibbs.

BIBLIOGRAPHY

Russell, Pearl. "Analysis of the Pacific Railroad reports." In *Washington Historical Quarterly*, 10:3-16, Jan., 1919.

Rodgers, Andrew Denny: *John Torrey, a Story of North American Botany*, Princeton University Press, 1942.

"Sidelights on the Stevens Railway Survey." In *Pacific Northwest Quarterly*, 36:233-248, July, 1945.

Smalley, Eugene V.: *History of the Northern Pacific Railroad*, Putnam, 1883.

Smithsonian Institution: *Annual Report*, (Continued on Page Twenty-seven)

Rare and Useful Plants from the Siskiyou

MRS. HARRY O. SMITH *

THE Siskiyou Mountain region of southern Oregon and northern California is a veritable paradise for plant collectors and botanists. Early pioneer collectors long ago sent seeds and specimen plants to European gardens for trial, many of which proved worthy of garden use. The continued efforts of plant hybridizers have sent back to us across the sea improved forms of many of our native plants, such as *Godetia*, *Clarkia*, *Nemophila*, *Oenothera*, *Eschscholtzia* and others.

As gardeners, we are just beginning to appreciate fully the increasing pleasure and duty that our wealth of native plant material can bring to gardens. To succeed with native plants, we must have an understanding of their cultural requirements. This is a climatic region of winter rainfall with no extremely low temperatures, followed by dry warm summers. Moisture-loving plants abound along water courses and in the paths of seepage from melting snows. The early spring abundance of bloom, in general, is followed by a dry resting period necessary to success with many species, especially those low-growing, floriferous plants most suitable for rock garden use, and the large numbers of bulbous plants.

Among the shrubs adapted to garden use I have chosen four. The first is our own Oregon grape (*Mahonia Aquifolium*), too well known to need description and generally available from nurseries. I might add that collected plants are very difficult to establish and that balled nursery specimens transplant readily. It is such a useful shrub: excellent hedge material, an unusually beautiful specimen plant, having both fleeting bloom and fine winter color.

The second is our sweetly fragrant, deciduous western *Azalea occidentalis*, a moisture-loving plant showing much variation in color

and habit of growth but always beautiful. This azalea requires the same soil as rhododendrons but does well in much sunnier locations if provided with plenty of moisture. It is a rapid grower when established, often reaching ten to fifteen feet in height. It is to be hoped that enterprising nurserymen will select and propagate plants of fine form in the complete color range from almost pure white to deep orange rose. Unfortunately, this lovely shrub is not hardy east of the Cascades.

The third choice is not hardy in the eastern part of our state, either, but I include it for its wonderful blue, the blue of the sky, the *Ceanothus* (*C. thyrsiflorus*), so often growing along our coast with rhododendrons and azaleas to form a color combination of breathtaking beauty.

The fourth, our creamy white ocean spray (*Holodiscus discolor*), sometimes called Indian Arrow Wood because of the straight stems of the new growth, deserves wider use. It is a most graceful plant which may well be used to lighten plantings of heavier material and to lengthen the season of bloom in the shrub border. It is now available from several nurseries.

A most attractive rock garden could be planned and planted using only native plants. We could begin the season with the early January bloom of the intense blue of *Synthyris rotundifolia*, variety *Sweetseri*, abundant on the forest floors of our valleys. This small gem is easily transplanted to the garden where it becomes even more attractive than in its native habitat and furnishes many more flowers. It has attractive winter foliage.

There are several fine phloxes growing upon the mountain slopes, not too easy in the garden, though the salmon colored *Phlox speciosa* and its rare albino form are well worth the trouble to establish from seed in very well-drained, slightly acid soil. The phlox with the best garden constitution indigenous to this region is the rather large flowered trailing salmon pink *Phlox adsurgens*, with shiny fo-

*Mrs. Harry O. Smith, Cave Junction, Ore., was happily persuaded to write for us by our Oregon Editorial Board Member, Mrs. E. B. Hanley. We are indebted to both for this interesting article on the flora of their area.

liage. At home among coniferous trees, it asks the same garden diet and layers itself happily. Layers from plants with good color and form are not difficult to establish.

The several indigenous *Lewisia*s are all interesting. Perhaps the most beautiful is *Lewisia Finchii*, with thick waxy rosettes from which break forth, on six-inch stems, clusters of salmon yellow flowers resembling single pinks. *Lewisia Howellii* is a close second. These grow in clefts in rocky cliffs, cliffs fortunately in many cases too steep to climb or they would disappear entirely. Plants should be purchased from rock garden specialists or grown from seed. *Lewisia oppositifolia* of valley meadows, with clusters of snowy white blossoms resembling miniature water lilies, is easier to grow. It is a deciduous species, requiring a dry summer resting period.

Delphinium nudicaule, our scarlet larkspur, is a startling plant in flower, reaching up from its rocky home like a tiny fireflame. It occurs in the same location where the dwarf dark purple larkspur (*D. Menziesii*) thrives. I have collected some interesting natural hybrids of the two species in pink, rose and lavender that I treasure highly. The small, fleshy rhizome is usually found resting on a rock and requires the usual dry resting period, resenting artificial watering by a quick demise.

Violet species are many and several are unusual. *Viola chrysantha* with ferny foliage, not in the least resembling a violet, though the rather large, yellow blossoms with brown tinted backs are typical. Tiny pansy-faced *V. cuneata* of dry hillsides and meadows in violet and white is worth establishing. *Viola Hallii*, called by children "wild pansies," is a beautiful plant with finely cut foliage and tiny cream and purple pansies. It is readily grown from seed, though snails will often devour the tiny plants.

Two rare *Vancouverias* are worthy of a place in the wild or rock garden: the bright yellow flowered *Vancouveria chrysantha*, and the evergreen *V. planipetala* (*parviflora*). These succeed in the same garden situation as their European and Asiatic relatives, the *Epi-mediums*, and are much daintier plants. Their

"upside-down" flowers are most quaint and interesting.

The loveliest of wild bleeding hearts, *Dicentra oregana*, grows enticingly in rocky clefts in favored situations. It has creamy white sprays of bloom faintly tinged with pink, a beautiful contrast against the delicate, glaucous foliage. It requires perfect drainage and has an added virtue in that it does not spread rankly as do our more common varieties.

Cypripedium californicum, with fragrant spikes of yellow and white slippers which thrives along our mountain streams, is easier to grow than the better known eastern varieties and a handsome plant as well.

It would take too much time to mention all the desirable bulbous plants from this area. *Erythroniums* we have in variety, of which the loveliest, rivaling choice lilies, is the comparatively robust and larger flowering *Erythronium giganteum* of cool shady canyons. *E. Hendersonii*, lavender, with a deep maroon purple eye, is the earliest to bloom. All *Erythroniums* are good, so do make use of them generously in your spring garden picture. If they like your garden, they will seed themselves readily.

Fritillaria recurva, or red bells, is well known and worth extra trouble to make it happy. I have seen well-grown stalks that far surpassed any wild plants. There are several *Calochorti*, or Mariposa tulips, to be found, the most striking of which is *Calochortus Howellii* which has a large white blossom with a green throat and dark markings. All these bulbs are delectable items in the diet of rodents, so the gardener must take necessary precautions.

A collection of native ferns would form a most interesting garden in itself, in size ranging from the six to eight-foot fronds of the giant chain fern, *Woodwardia radicans*, to tiny rock ferns from mountain meadows.

Yes, we gardeners admire these plants that nature has so abundantly given. Let us be ever alert to protect and preserve them. One good way to do so is to make them permanent, privileged inhabitants of our gardens and the gardens of the future.

Alaska Cedar

(*Chamaecyparis nootkatensis* (D. Don.) Spach.)

C. FRANK BROCKMAN *

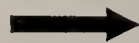
THE name, Alaska cedar, is in itself suggestive of the habitat of this tree. While it occurs at sea level at the northern extension of its range—along the coast and adjacent islands of southeastern Alaska and northern British Columbia—it is found at gradually ascending elevations as it progresses to its southern limit in the south Oregon Cascade Mountains. Washingtonians must travel to elevations of at least 2500 feet before climatic conditions preferred by this tree are found. Fortunately, this is not difficult to do. Several good highways enable one to drive easily from the shores of Puget Sound to the Cascade passes, or to places like Mount Rainier National Park or the Hudsonian zone meadows in the vicinity of Mount Baker or Mount Shuksan, and in so doing we place ourselves in a position to become acquainted with this interesting tree.

In one respect it resembles the western red cedar (*Thuja plicata*), so common at the lower elevations, for its foliage is scale-like. However, with but slightly more than average observation a number of very distinctive differences between these two species will be quite evident. In the first place, the foliage of the Alaska cedar is harsh to the touch, due to the fact that the scale-like leaves are characterized by distinctive, spreading points. Thus, it is unlike the smooth foliage of the western red cedar. Secondly, the cones of the Alaska cedar are round rather than oblong, being slightly less than one-half inch in diameter. Another distinctive difference between these two species will be noted in the bark. That of the Alaska cedar is ash-gray in color and typified by thin,

elongated plates that are loose at the ends, rather than brownish-gray and fibrous as in the case of the western red cedar. Finally, the Alaska cedar is characterized by a form that rarely fails to catch one's attention. The branches of the narrow crown have a distinctive weeping, even "wilted" appearance. So pronounced is this feature in some cases that the tree seems to be suffering from lack of moisture.

It is most prominent in the intermediate timber zone of the Cascades and Olympics, between elevations of 3500 and 5500 feet above sea level, where its principal associates are noble fir (*Abies procera*) and western white pine (*Pinus monticola*). As one might expect it never attains large size. Although some individuals may exceed these figures, heights of 50 to 75 feet and diameters of one to two feet are average. Of course, when encountered in the sub-alpine and timberline zones it is much smaller. In exposed situations at those levels it often exhibits the typical rugged, windblown appearance characteristic of other tree pioneers.

As in the case of the western red cedar this tree, in spite of its generally accepted common name, is not a true cedar. True cedars (*Cedrus*) are not native to North America. Consequently another more fitting common name would seem to be desirable, yet while Nootka falsecypress, yellow cypress, and Sitka cypress are occasionally used, none of these have, as yet, been able to establish themselves firmly as an accepted designation for this tree.



Trunks of Alaska cedar (*Chamaecyparis nootkatensis*), illustrating typical shaggy bark character.

—ASAHEL CURTIS PHOTO

* The fourth in our series of notes on native Northwest trees by Prof. C. Frank Brockman of the School of Forestry, University of Washington.



ARBORETUM SPOTLIGHT

South of the Border

SOME may spend a holiday vacation “down Mexico way”; a few may even journey farther to enjoy the scintillating beauty of South America, but to the many who must stay at home, they have no reason to sigh for visitors from these lands will come to greet us, if there spells welcome at our door. Visitors in another sense—plants from “south of the border.”

From the land of Chile comes a generous shrub which pays its way every month of the year. It is the *Pernettya mucronata*, another member of the *Ericaceae* (Heath) family.

Strangely enough, it has no common name so one is immediately compelled to call it by its botanical classification.

Pernettya is a broadleaved evergreen shrub ranging from two to four feet in height, readily spreading by underground suckers if grown in a light soil amply supplied with humus. It

prefers full sun and moderate moisture. If over-watered, the shrub tends to send up many leggy shoots.

The dark green, fine-textured foliage alone would make this shrub valuable in landscape plantings, but *Pernettya* is most noted for its various colored berries, ranging from pure white to pink to crimson and purple. They color early in the fall and remain on the shrub through the winter, often until April. The edible fruit is quite sweet. Always include one or more male pollenizer plants in the planting to insure heavy fruiting.

There is a mass grouping of *Pernettya* by the Club House at the Administration Area. Come and see; learn of the virtues of this outstanding shrub from “south of the border.”

R. J. HANSEN

Below: *Pernettya mucronata* in fruit

—PHOTO BY E. F. MARTEN



Hollies of the Southeastern States

H. HAROLD HUME *

HOLLIES native in the United States, according to Small's "Manual of the Southeastern Flora" and Fernald's "Gray's Manual of Botany," number nineteen species and a few botanical varieties and forms. To these E. J. Alexander in 1941 added another species first described from Whitetop mountain in western Virginia, making a total of twenty. All of them, except Alexander's *Ilex collina*, a deciduous sort, are native in the southeastern area and a total of fourteen are credited to Florida, more perhaps than are endemic in any other state.

The southeastern group is made up of three evergreen species with black fruit, *Ilex coriacea*, *glabra* and *Krugiana*; five evergreen ones with red fruit, *Ilex Cassine*, *cumulicola*, *myrtifolia*, *opaca* and *vomitoria*; and eleven deciduous hollies that bear red fruits, *Ilex ambigua*, *Amelanchier*, *Beadlei*, *Buswellii*, *Curtissii*, *Cuthbertii*, *decidua*, *laevigata*, *longipes*, *monticola* and *verticillata*. It is well to keep in mind that plants under natural conditions grow as they will and that classifications are man-made. Botanists are not always in agreement in classifying hollies.

Most of the species listed have potential garden values, but only a limited number, *I. glabra*, *opaca*, and *vomitoria*, have been used freely in garden plantings and *laevigata* and *verticillata* have been cultivated to some extent. As a group native American hollies have been slighted in favor of exotics of other groups but now, in the eastern parts of the United States, *I. opaca* is receiving a large share of much merited attention. For many years the only specimens available for garden plantings were secured from woods and fields, either directly or by way of the nursery trade. Now attention is being given to vegetative propagation, a development of forty years or

so, and many named varieties of *I. opaca* are available from nursery sources. Exotic species, and some garden varieties derived from them, are available in considerable numbers, most of them very desirable.

Black Fruited Hollies

Of the black fruited, native evergreen hollies, *Ilex glabra* is the most important. Commonly throughout those parts of the southeastern states where it occurs, it is known as Gallberry, a name indicative of the bitter gall-like taste of its fruit. In northern sections where it is much less common as a native plant, and more frequently found in gardens than in the southeast, it goes by the name of Inkberry, descriptive of its ink-black fruits. It is the most abundant of all native hollies, widely distributed, found from Nova Scotia into Florida and west into Louisiana. It probably is most abundant in northeastern Florida and southeastern Georgia where it is distributed over thousands of acres. It grows there on moist lands in association with pine, saw palmetto, wax myrtle and sweet gum. It forms dense clumps, apparently started from single plants, usually of one sex, pistillate or staminate as the case may be, from which it spreads outward by means of underground stems. Some of these clumps may be very old, a century or more. In short, their life may well be endless. The gallberry reaches a height of ten feet at times, but since it is burned off frequently in many sections, it is usually about three to five feet high. Its branches are upright, well covered over the top and sides of the clumps with small shining dark green leaves, usually obovate in outline. Fruits, borne of course only by the pistillate specimens, are jet black and attractive, often produced very abundantly. In the garden it is a good plant for masses and low screens. It can be used as a hedge but needs to be kept within bounds by root pruning.

Ilex coriacea makes a larger plant, even up to fifteen feet. It, too, usually grows in clumps

*Dr. H. Harold Hume is well known to readers of The Bulletin as the author of "Camellias in America" and we are honored to add his distinguished name to our list of authors. Dr. Hume is Dean Emeritus, College of Agriculture, University of Florida, Gainesville, Fla.

but these are open, with more widely spaced branches than are those formed by *Ilex glabra*. Sometimes it does not spread but forms a small tree. Its leaves are leathery, dark green, variously shaped, oval, obovate or elliptic. The fruits are quite large, black and glossy, somewhat flattened and borne singly in the leaf axils. They ripen early, August to September, and by October are gone. They are juicy, said to be edible, but they can scarcely be classed as agreeable in taste. They are beloved by birds of several species.

Another black fruited holly, that really belongs to the West Indies, is *Ilex Krugiana*, found in the extreme southeastern portion of Florida. It grows as a tree to thirty or forty feet. Its leaves are dark matt green, three to four inches long and one and a half to two inches wide, quite unlike those of any other American holly, elliptic or ovate in outline with entire margins. Fruits are small, globose, purplish black in color. So far as known it has not been cultivated, but would be an interesting addition to garden plants in areas where adapted. Probably it could be grown in all of the southern half of Florida.

Evergreen Species with Red Fruits

Species belonging to this group, with the exception of *Ilex cumulicola*, are quite widely distributed in the southeastern states. Specimens of all of them are known that bear yellow fruits and it is not too much to say that yellow is a recessive color in all hollies that normally bear red fruit. *Ilex opaca* is found far outside the limits of the area and *Ilex vomitoria* occurs as a native westward into Texas and Arkansas. *Ilex Cassine* and *I. myrtifolia* are wet land trees, *Ilex cumulicola* and *Ilex vomitoria* usually are found on sandy, well-drained soils, while *Ilex opaca* is at its best on drained soils that at the same time have a high moisture content.

The Dahoon holly, *I. Cassine*, grows as a small tree to 40 feet with a trunk diameter of 12 to 16 inches. Its bark is smooth and dark gray. Leaves are variable in size and shape, obovate to elliptic and sometimes oblanceolate, measuring two to four inches in length. Some of its variations have been described as

botanical varieties and forms, a classification without real foundation because all of them may be found growing together in restricted areas. Fruit is bright red, occasionally yellow or orange, produced abundantly, often in compact clusters and held throughout the winter unless removed by birds. One variety, Glen-cassine, has been selected and propagated. The number of varieties could be increased to advantage were there a demand for them.

Ilex cumulicola, the Dune holly, so far as known, is confined to Florida where it grows on the interior dunes, sandy areas that support a growth mainly of scrub oak, sand pine, hickory and other trees. Under these conditions it makes a small tree but where it sometimes has strayed to better soils it reaches sizable proportions. Its habit of growth is fastigate, the leaves also are erect, elliptic or cuneate, provided with very sharp spines that point toward the leaf tips. Its fruits are large, ellipsoid to globose, brilliant red and when crushed, scented like a ripe apple but he who tastes them will long remember their bitter, gall-like flavor. It is well suited for sandy, well-drained soils. One variety, Fort McCoy, has been named and propagated.

Among American hollies, *I. myrtifolia* is the most picturesque and artistic. Its trunk is crooked in different directions, its leaves are small, linear or narrowly elliptic, up to an inch and a half long. Fruits, usually produced in abundance, are bright red on most specimens, orange or yellow on others. Some yellow fruited varieties have been given taxonomic names, but in a species so variable in its fruit coloring there appears to be little reason for so doing. Bright fruits and small dark green leaves make a pleasing combination. The species has high garden value where an unusual, attractive tree of small size (to 20 feet) is desired.

Upper:

Ilex vomitoria, the Yaupon Holly

—Photo courtesy J. Horace McFarland Co., Harrisburg, Penn.

Lower:

Ilex glabra, Gallberry

—Photo courtesy J. Horace McFarland Co., Harrisburg, Penn.



Of all the hollies native in the southeast, *Ilex opaca*, usually referred to as the American holly, is the most highly esteemed and commonly planted. It, too, is a variable species; to such an extent is this true, that specimens differing widely in growth habit, leaf size and form, and abundance and color of fruit, are the rule and not the exception. It may even be true that most desirable variations are already in existence somewhere among native trees. It is sometimes stated that *I. opaca* is not so beautiful a tree as *I. Aquifolium*, the English holly, but there is a limited number of American hollies that closely approach the English holly in their glossy foliage and abundant red fruits. Several selections of *I. opaca* have been made and propagated in the Southeast. In fact, propagation of named varieties of this species was undertaken in Florida nearly fifty years ago. Important varieties of the region are: East Palatka, noted for its small, almost spineless leaves and abundant fruiting; Howard, for its fine glossy foliage and bright red attractive fruits; Hume No. 2, for its dense growth, large, nearly spineless leaves and heavy crops of berries, and Taber No. 3 for its fastigate habit. Croonenberg, from southeastern Virginia, is a typical holly of slow growth, good foliage and fruits. All of these make large-sized trees.

Ilex vomitoria, with the common Indian name, Yaupon, grows as a shrub or as a small tree up to twenty-five feet. Usually, it grows fairly close to the shores of the Atlantic ocean and the Gulf of Mexico, but sometimes extends a considerable distance inland as in Louisiana, Texas and Arkansas. It is characterized by rigid growth, small, semi-translucent fruits and small ovate or elliptic, bright green, blunt pointed, crenate leaves. A well-grown specimen with its abundant clustered fruits is very attractive. The fruits last well through the winter. It stands shearing well and is valuable for formal uses and the making of hedges in those areas to which it is adapted. In two respects it is an unusual holly. It is the only native evergreen holly that bears its flowers in spring on growth of the previous season and not on new shoots, and its leaves

contain caffeine, up to 1.65 per cent of dry weight in some instances. From its leaves the Indians in the areas where it is native made their ceremonial drink, the use of which was first observed by DeVaca (1528) in Texas and by LeMoyne in Florida at the mouth of the St. Johns River (1564).

Deciduous Hollies

Some of the hollies that drop their leaves in autumn and so expose their fruits to clear view make excellent garden plants. Of the group, *I. verticillata* and *I. laevigata* have been used to considerable extent in northern sections. Three species occur in peninsular Florida, *I. Curtissii* in the northern part, *I. ambigua* central, and *I. Buswellii* far south. *I. Curtissii* is particularly attractive. It grows as a shrub or small, artistic tree and holds an abundant crop of red fruits throughout the winter. Many of the deciduous species are not available through the nursery trade but several good ones can be secured from that source.

Propagating Hollies

Works on plant propagation state that hollies may be increased in numbers in several ways but the whole story, because of space limitations in such books, is seldom told. Information given is often based on a single species and does not cover the genus as a whole. Various methods of propagation can be used, some of them adapted to one kind of holly, others to several species. But by one way or another—from seeds, divisions, cuttings, buds or grafts—all of them may be increased.

With reference to growing hollies from seed, it is commonly stated that the seed must be stratified or mixed with soil and kept for a year under natural outdoor conditions before planting. This can be done by placing the mixture of seed and soil in a box provided with a number of holes, and burying it under six or eight inches of soil on a ditch bank or some similar place to insure good drainage. A year later the box is taken up, the seeds screened from the soil and sown. This method is best for seeds of many varieties of *I. opaca*,

(Continued on Page Thirty)

Two Hollies at Wisley

ROBERT ADAMS *

THROUGHOUT Britain the Holly (*Ilex Aquifolium*) is the most widespread and the commonest of our evergreens. It may be found wild in a variety of conditions, thriving in Beech woods with the Sessile Oak (*Quercus petraea*), or, as at Wisley, in company with the English Oak (*Quercus robur*).

Inside the Gardens are cultivated two introductions from the East. The Japanese Holly (*Ilex latifolia*) was planted by G. F. Wilson before the turn of the century and the original tree has flourished exceedingly. Wilson's chief delight was to try to naturalize exotic plants and, no doubt, this tree was one of his subjects, for it was not until 1866 that it was recorded as flowering in the temperate house at Kew. As a result of Wilson's endeavours we have found no evidence of the fulfilment of his original hopes; there is still only one tree but this alone has justified his efforts.

In its woodland surroundings it is now nearly 30 feet high and fruits regularly but seldom heavily, if the fertility of some of its congeners is used as a criterion. In a good season the brick-red berries appear in heavy clusters but in some gardens these may pass unnoticed when such fiery-coloured plants as *Pyracantha* are nearby. In size the thick stout leaves are nearly equal to those of *Magnolia grandiflora*. At each end they are tapered and the margins serrated by shallow teeth, while in colour the upper surface is a rich glossy green and a pale yellowy-green beneath.

Often it is said that this Holly is not hardy but our tree adds no evidence to this assumption; it is planted in a cold spot in a cold garden. Against this fact we must say that the soil is moist—a prerequisite for all Hollies

—also that Wilson was wise enough to screen his plant on one side with hardy Rhododendrons which, in turn, are now nearly 20 feet high.

The second of the Hollies grown at Wisley for many years is *Ilex Fargesii*. It was introduced in 1900 by Messrs. Veitch's collector, E. H. Wilson, from Western China, where it is said to reach a height of 15 feet or more. In cultivation it is still a rare plant.

The young branches are a glossy green colour and smooth. A great variation occurs in the shape of the leaves; some are long and narrow, while on our plant the typical shape is oblanceolate with an attenuated apex. In every case the margins are lightly serrulate toward the apex, the blade of a tough, leathery nature and the petioles a light shade of yellowy-green.

From time to time the bush is cut to the ground in severe winters but is not killed, and indeed quickly recovers from such treatment. Unfortunately, this Holly has never flowered at Wisley nor, in consequence, borne its small axillary clusters of red berries. This fact we can attribute to our climate for it does so in such favoured districts as along the coast of County Down, Northern Ireland.



*Mr. Robert Adams is Assistant to the Director of the Royal Horticultural Society's Gardens, Wisley, England.

Ilex Fargesii

—PHOTO BY R. P. SCASE (WISLEY)

A Holly Problem

HARRY E. NELSON *

SOMEWHERE about this time of the year gardeners begin cursing their nurserymen because a holly purchased one to ten years previously has not borne berries, even though they may have had them at the time of purchase. There are two possible reasons for this non-berrying, only one of which may be blamed upon the nurseryman. If the plant had berries at the time of purchase it will berry again, providing the gardener knows how to assist the plant.

First of all, the plant must flower in order to berry, and at that time the gardener may determine the sex of the plant. Flowering is normally done during March, April or May, although some plants bloom out of season in the fall. If the flowers have four stamens coming from the center of the flower, surmounted by the golden pollen-bearing anthers, it will not have berries. These plants must be grafted.

*Mr. Harry E. Nelson is Head of the Department of Floriculture, City College of San Francisco, Calif.

If the center of the flower has a green berry-like development, it will bear providing it has reached the proper stage of maturity. Many hollies will grow for ten to fifteen years without carrying a berry and then suddenly come into maturity and bear each year.

The holly is a comparatively slow-growing plant that under good cultural conditions will have a better root development than top. When this conditions prevails, the plant has no occasion to bear. If the roots be carefully cut, the plant may be induced to berry the following season. Root pruning requires some study of the plant size and spread before trying. It not only reduces the amount of root system but also threatens the existence of the plant. If carelessly done, some of the foliage will drop or the plant may even die back to compensate for the root cutting.

Draw an imaginary line around the plant on the soil to correspond to the spread of the

(Continued on Page Twenty-one)



Hollies in the Arboretum

B. O. MULLIGAN

ALTHOUGH a few individual specimens of English holly and of some other species (*Ilex crenata*, *I. latifolia*, *I. Pernyi*) were planted prior to the war on the bank at the south end of the Upper Road, it was not until the spring of 1949 that new ground was prepared for a representative collection of species, varieties, and hybrids of this ornamental genus.

This planting was stimulated by the action of the State Conservation Society in November, 1947, in donating funds for the purchase of a collection of hollies in order to establish a holly grove in the Arboretum. This initial collection comprised twenty-one forms of the American holly (*Ilex opaca*), ten varieties or hybrids of English holly (*Ilex Aquifolium*), and six of the Japanese *Ilex crenata*.

To receive these, and others already in the nursery, a group of five new beds was marked out and prepared during the winter of 1948 on a piece of ground immediately west of the Upper Road, not far from its south end, where some young *Platanus* trees were growing vigorously surrounded by native maples and dogwoods. In mid-March, 1949, twenty-nine species and varieties, totaling one hundred thirteen plants, were set out. The arrangement was principally according to their botanical relationships; one bed for English holly and its variations, one for its hybrids, one for related Asiatic species including the Chinese *I. cornuta* and *I. Pernyi*, one for American hollies (*I. opaca* varieties), and the fifth for those of the same section (*Lioprinus*) such as *I. pedunculosa* and *I. crenata* from Japan, and the Dahoon holly (*Ilex Cassine*) from the southeastern U. S. A. For the deciduous species of the subgenus *Prinos* an additional bed was made subsequently at the south end of the area, and now contains representatives of the native American *Ilex decidua* and *I.*

verticillata, the Black-Alder, and of *I. serrata* from Japan.

Planting losses were negligible, but late in January and early in February, 1950, when Seattle had an abnormally cold spell of weather for about three weeks (sixteen days with the temperature below freezing, and a minimum low of from 3° to 8° F. on ten days), our young holly collection received a severe shock. None was entirely killed, although several such as the Himalayan *Ilex insignis*, the Chinese *I. purpurea*, and *I. rotunda* from Japan were cut to the soil line or near it; *I. cornuta* and its variety *Burfordii* were defoliated, as were the leading shoots of *I. Cassine*. A variegated form of English holly (*argentea marginata*) was the only one of its kind to be damaged, two plants out of four being killed to the snow line. The broad leaves of *I. latifolia* and the much smaller and more spiny ones of *I. Pernyi* were also temporarily discolored.

Between May, 1950, and April, 1952, some few additions have been made to the beds, so that there are now approximately twenty species assembled there, plus thirty varieties and five hybrids. In the nursery and lath house, besides two other species, are thirty-seven additional varieties, of which seventeen were again donated in November, 1950, by the State Conservation Society, and two more hybrids; most of these will soon be planted out among or adjacent to the earlier groups. An additional bed has been cleared down the bank to the north to take care of some of these, especially the numerous variations of the English holly, of which we now have thirty-one; of *I. opaca* the total is twenty, and of *I. crenata*, eight.

So it can be said that the collection is fairly representative, especially of those three species, although we need and are continually looking out for plants or seeds of more of the native hollies of the Southeastern U. S. A., about which Dr. Hume writes so clearly else-

(Continued on Page Thirty)

Left to right: *Ilex Aquifolium* var. *myrtifolia*, *Ilex Aquifolium* var. *ferox variegata*, and *Ilex Aquifolium* var. *recurva*

—PHOTO BY E. F. MARTEN

Diseases of Holly in the Pacific Northwest

ROY A. YOUNG AND I. W. DEEP *

CULTURE of holly in the Pacific Northwest has increased greatly in the past 25 years as the production of cut holly and young trees has developed into a substantial specialty crop industry. Many species of holly are grown in landscape plantings, but plantings grown for commercial production of cut holly consist almost entirely of different varieties of English holly (*Ilex Aquifolium*). These observations on diseases of holly prevalent in the Pacific Northwest all pertain to English holly.

Fortunately for holly fanciers and commercial growers there are relatively few diseases of holly in this area and the danger of losses from diseases can be greatly reduced by the selection of proper planting site and proper culture. Canker diseases of twigs and branches, leaf diseases, and more rarely a root rot disease have been observed. The stem canker diseases are the most destructive.

The twig and stem canker of holly caused by the fungus *Boydia insculpta* (Oud.) Groves, was first reported in England in 1921, and was observed in 1939 on several branches of holly from the Puget Sound area in Washington where considerable damage was reported to holly in hedgerows. The disease has been found at four locations in Oregon. One planting near the coast was so severely affected in 1951 that more than 50 per cent of the twig tips were killed. This planting was bordered on three sides by high, tree-covered hills, and wind movement through the planting was greatly restricted. The *Boydia* canker disease has been observed in other locations in Oregon but does not appear to be a serious problem in holly plantings situated in a moderately open site where air movement is not too greatly restricted. This disease affects new twig growth and older branches. Affected branches die back from the tip as a result of girdling action of the fungus farther along the twig or branch. Dead twig-tips are commonly light brown with a darker brown area adjacent

to healthy tissue. In periods of moist weather yellowish-white, gelatinous horns of spores may be seen extruding from black fungus fruiting bodies that are formed in the dead holly tissues.

A second stem canker disease of holly, caused by *Phomopsis crustosa* (Sacc.) Bomm. and Rouss. was reported in 1935 from the vicinity of Astoria on the Oregon coast, and in the Willamette valley. On young holly twigs *Phomopsis* canker develops as a bright brown surface spot which soon becomes dried and sunken. Cankers on older stems are dark brown and sunken. This disease has not caused conspicuous damage during the past four or five years.

A third type of canker may develop near the ground level on the main stem of young holly plants shortly after they are removed from lath houses or cutting beds and planted in an open space. Commonly these cankers result from heat injury to the bark on the south side of the exposed stem. Such injury offers a point for entry of mildly parasitic fungi which may continue to grow and girdle the entire stem. To prevent development of heat cankers care should be taken to avoid exposing tender young plants to full heat of the sun.

No destructive plant pathogens have been associated with leaf disorders of holly in the Pacific Northwest. However, secondary fungus invaders may develop on leaves that have been injured by excessive cold or heat, or by mechanical injury such as that caused by wind whipping. Leaves on trees with long, willowy branches frequently are damaged by wind whipping that results in penetration of the spines of one leaf through another.

The development of algae and fungi on the surface of holly leaves, although not damaging to the leaves, is a serious problem for most

(Continued on Page Twenty-three)

*Dr. Roy A. Young is Associate Pathologist, Oregon State College, Corvallis, Ore.

Germination of Holly Seeds at Arboretum

B. O. MULLIGAN AND L. J. MICHAUD *

RECORDS for the years 1947-1950 inclusive show that out of some 20 species received and sown, good germination has only been obtained in two instances, fair or poor in six, and none in the remainder. Of a few, however, the seeds were found to be dead.

The usual treatment has been to wrap the seeds in cheesecloth and store them in cans in moist peat at a temperature of 40 degrees F., for a period of not less than 90 and sometimes as much as 240 or 300 days, occasionally even longer. By this method, very good germination was obtained in mid-October, 1950, from *Ilex Fargesii*, previously stratified 219 days from May, 1949, to January, 1950; good in the case of *Ilex myrtifolia*, after stratification for 91 days from August to November, 1947, germination taking place in January, 1948;

only fair for *I. montana*, stratified 290 days from January to November, 1949, germinating in April, 1951, and for *I. Perardo*, after 180 days stratification from July, 1949, to January 1950, germinating May, 1951. The last, in a flat, was in a cold frame from mid-December, 1950, until germination occurred.

Pre-treatment with sulphuric acid for up to 45 minutes has not materially helped, although only *I. coriacea* and *I. glabra* have been so treated.

Amongst those which failed to germinate were *I. coriacea*, *I. macrocarpa*, *I. macropoda*, three Himalayan species, *I. fragilis*, *I. Hookeri* and *I. insignis*, and two native deciduous species, *I. laevigata* and *I. decidua*.

More experiments are obviously needed, with as many species as possible, to discover the best methods of treatment, but certainly the raising of hollies from seeds is a slow and uncertain process.

*A note on holly germination by our director, Mr. Mulligan, and nursery foreman, Mr. L. J. Michaud.



The Propagation of American and English Holly for the Amateur

HENRY M. BIEKART *

IT SHOULD be realized at the outset that this article is written with the climatic conditions in mind as they prevail on the mid-east coast of the United States. These conditions vary considerably from those around Seattle, particularly in regard to light intensity, humidity and temperature. It will therefore be well to bear in mind that my recommendations may require some modification in management and timing.

During the past five or six years there has been a tremendous increase in the demand for all forms of American holly, *Ilex opaca*, and this demand is entirely justified because of the dignity and inherent beauty of this native tree. The best selections of holly now offered are a far cry from the typical native type, and there is still ample room for improvement in placement, color and size of the berries, and foliar structure, color and durability.

There was a time when varieties of American holly were reproduced exclusively by grafting but it has been thoroughly proven that plants grown from cuttings are just as satisfactory and much easier to produce.

Selection and preparing of cutting material: It has been shown repeatedly that the type of tree from which cuttings are taken has a great bearing on the results. The stock plant, that is, the one from which the cuttings are taken, should be neither overvegetative nor undervegetative but of normal growth. Relatively soft growth from overvegetative trees is more subject to rot, while relative hard growth from undervegetative trees will usually root very slowly. The cutting material should be free of insect and disease injury and have no leaf spot.

Cuttings four to five inches long taken from the ends of the current year's growth give in general the best response. Those fully exposed to light are most desirable.

The uppermost three or four leaves should be left on the cuttings and the leaves should not be reduced in size. About one and a half to two inches of the lower part of the stem is made free of leaves by cutting, not tearing them off. The lower cut across the stem should be about a quarter inch below a node and must be made with a razor-sharp knife to insure a clean cut and not a bruised surface. The latter is slower to heal and rot may occur.

If the cuttings cannot be placed immediately, put them in a basket lined and covered with wet paper. In this manner they may be kept for several hours without harm. Do not submerge them in water.

Time of the year to make cuttings: In the middle east, late August and early September is the best time to take holly cuttings. The growth is then of the proper maturity.

Propagation in a small box: Amateurs usually wish to grow plants in the most simple structures and with the least expense. I have good news for this large group.

All that you need is an eight-inch deep box, with a length and width to suit your purpose, a pane of glass to cover it, some peat, some coarse sand and a little oak leafmold. Proceed in the following manner: Mix thoroughly three parts of peatmoss and one part of leafmold, place two inches of this mixture in the bottom of the box, moisten it well. Prepare a second layer by mixing one part of coarse sand with one part of peatmoss and put in one inch of this mixture. For a third layer use one inch of coarse sand. Afterwards water carefully with a fine spray until the water shows on the top. A few hours later the cuttings can be placed.

Root promoting substances: Root promoting substances, or synthetic hormones, hasten the rooting of cuttings but are not necessary for their successful development. They have to be used with care, both in liquid or in dust form, because an overdose results in burning

*Mr. Henry M. Biekart is Associate Professor of Ornamental Horticulture, Rutgers University, New Brunswick, N. J.

of the cells and increases the possibility of rot. If you desire to use it, try some with and some without this treatment. You will then be able to determine whether it is worth while or not under your conditions.

Method of placing cuttings: Place the base of the cutting in a 1½-inch deep groove cut with a heavy knife or putty knife and set them in a severely slanting position so that the leaves almost rest on the sand. This position of the cuttings will greatly reduce their loss of moisture and more favorable conditions for early rooting will prevail. They may be placed about two inches apart in the row and about four inches apart between the rows. Firm each row gently with the fingertips. When all cuttings are placed, water thoroughly. This will insure a close contact between the rooting medium and the stems of the cuttings which is necessary for a ready intake of water.

Location of the box: Although light is necessary, direct sunlight is harmful on unrooted cuttings. The north side of a building or the shade of tall trees or large shrubs is close to ideal. Put the glass cover on immediately after the final watering and do not ventilate the box. Sufficient fresh air enters between the wood and the glass to cause a slight circulation. By this method of treatment watering may not be necessary for several weeks. Water only when moisture seems necessary.

When to remove the cuttings: Rooting will take place in anywhere from four weeks to three months, but no matter when it occurs, the cuttings are left in the box throughout the winter. Here in the east they are uncovered in the spring and transplanted from the box into a cold frame in late September. The following April or May they are planted out of doors. With your climatic conditions it is very well possible that the cuttings can be planted in the open in the spring following the rooting in the fall, and that no frame protection during the first winter is necessary.

Transplanting should be done of course with the greatest of care. Be sure that the rooting medium is thoroughly moistened before lifting the plants. This will help greatly in removing the plants with the least root injury. Always

transplant on a quiet, dull day. Such weather conditions will reduce the rate of loss of moisture from the leaves and the danger of wilting is greatly reduced. Be sure to water well after transplanting.

Propagation in frames: Those of you who wish to increase their number of plants rapidly can do so in a coldframe. The preparation of the frame is the same as for the box, or a mixture of 50 per cent peat and 50 per cent sharp sand can be used as is the custom with many commercial growers. Since frames are usually placed in full sunlight shading of the frame is of course necessary on sunny days. This entails closer attention and more work and I do not recommend this method to those whose time is very much occupied with other matters.

Other types of holly can also be readily reproduced from cuttings and should be treated essentially in the same manner as described for the American and English holly. A mixture of two parts of sand and one part of peat in the propagation box will be quite satisfactory if the preparation of the three separate layers as described above seems too much work.

✓ ✓ ✓

A Holly Problem

(Continued from Page Sixteen)

top. Make another line just inside this line about three inches; this is the one you follow when cutting. Drive a sharp spade directly down into the soil as far as it will go without moving the soil itself. This will cut any roots in the top eight or nine inches of soil. Follow the inner line all around the plant, making these cuts clean. This root pruning should be done sometime from October to December. It should result in flowering the following spring which, in turn, would be followed by berries the next Christmas. If the root pruning can be done during a light rain or foggy period, the plant will be better able to tolerate it without wilting. Do not reduce the top by pruning if root pruning has been done since it would only serve to counteract the desired condition.

The Arboretum Bulletin

VOL. XV, No. 4 SEATTLE, WASH. WINTER, 1952

No part of this BULLETIN may be reprinted without the authority of the Arboretum Foundation.

ARBORETUM FOUNDATION OFFICE HOURS

9 a. m. to 4:30 p. m.
Monday through Friday
Phone MInor 4510

ARBORETUM FOUNDATION OFFICERS

DR. JACKSON K. HOLLOWAY, *President*
EDWARD L. ROSLING, *Vice-President*
ALBERT F. HULL, *Vice-President*
MRS. FRANK CALVERT, *Vice-President*
MRS. WM. D. SHANNON, *Secretary*
MRS. HARRY B. JONES, *Treasurer*
MISS GENE WEBB, *Executive Secretary*

BULLETIN EDITORIAL BOARD

MRS. J. THOMAS DOWLING
MRS. CASPER CLARKE BRIAN O. MULLIGAN
BRYAN TAYLOR C. FRANK BROCKMAN
MRS. O. B. THORGRIMSON DR. LEO HITCHCOCK
Oregon Member: MRS. E. B. HANLEY

Special Notice

To keep memberships in the Arboretum Foundation in good standing, dues should be paid during the month payable. Active memberships more than three months in arrears and previously established \$2 memberships more than thirty days in arrears will be dropped and THE BULLETIN will be discontinued.

Arboretum Membership Blank

- | | |
|---|----------|
| <input type="checkbox"/> Active | \$ 5.00 |
| <input type="checkbox"/> Contributing | 10.00 |
| <input type="checkbox"/> Supporting | 25.00 |
| <input type="checkbox"/> Sustaining | 50.00 |
| <input type="checkbox"/> Sponsor | 100.00 |
| <input type="checkbox"/> Life | 500.00 |
| <input type="checkbox"/> Endowment | 1,000.00 |

The Arboretum Foundation,
University of Washington Arboretum
Seattle 5, Washington

I hereby apply for membership in the Arboretum Foundation and remittance for same is enclosed to cover dues for the next succeeding 12 months.

Name.....

Address

All memberships are non-assessable.

Notes and Comment

New officers of the Arboretum Foundation for the year 1952-1953 as elected at the annual meeting of members are:

President—Dr. Jackson K. Holloway
Vice-President—Edward L. Rosling
Vice-President—Albert F. Hull
Vice-President—Mrs. Frank Calvert
Treasurer—Mrs. Harry B. Jones
Secretary—Mrs. Wm. D. Shannon
Executive Secretary—Miss Gene Webb

New members of the Board of Directors, elected for a one-year term, are: Mrs. Burle D. Bramhall, Mrs. John A. Clark, Bryant R. Dunn, all of Seattle; Mrs. Roger W. Peck and Mrs. Philip Weyerhaeuser, Tacoma; John H. Happy and Roderick A. Lindsay, Spokane.

Re-elected for a one-year term: Cebert Baillargeon, Mrs. Carl M. Ballard, Mrs. J. Swift Baker, Mrs. Clarence Blethen, Mrs. Lawrence Bogle, Mrs. James Brennen, Mrs. Frederick A. Bunge, Mrs. Frank Calvert, Mrs. Wm. Calvert, Jr., M. M. Chism, Newman Clark, Mrs. Herbert E. Coe, Mrs. J. Thomas Dowling, Ben Ehrlichman, Mrs. Henry C. Field, Edward I. Garrett, Donald G. Graham, Mrs. Loren Grinstead, Clinton S. Harley, R. Bronsdon Harris, John H. Hauberg, Jr., Mrs. Langdon C. Henry, Dr. Jackson K. Holloway, Albert F. Hull, Mrs. Harry B. Jones, Mrs. Arthur J. Krauss, Mrs. H. R. Lawton, Roy S. Leighton, C. B. Lindeman, Mrs. Philip Macbride, Dean Gordon Marckworth, Roy L. Maryatt, Mrs. Alexander F. McEwan, Miss Annie McFee, Winlock Miller, Dr. Walter A. Moore, Mrs. Harry O'Donnell, W. F. Paddock, Mrs. Don Palmer, Howard W. Parish, Mrs. Frank M. Preston, Mrs. Hazel M. Pringle, Victor Rabel, Mrs. F. G. Raines, Mrs. Chester Reitze, Edward L. Rosling, Mrs. John E. Ryan, S. L. Savidge, Mrs. Stanley S. Sayres, Mrs. William D. Shannon, Mrs. Emil Sick, Mrs. C. W. Stimson, O. B. Thorgrimson, R. C. Torrance, P. B. Truax, Nelson A. Wahlstrom, Dr. Frank Wanamaker, Charles S. Wills, Mrs. James W. Wylie and Thomas Youell.

Mrs. W. H. Abbott and Mrs. A. R. Walker, Bellingham; Mrs. R. E. Hensel, Bremerton;

A. S. Cory, Chehalis; Mrs. R. L. Rutter, Ellensburg; V. I. Whitney, Montesano; Mrs. G. O. Moen, Mt. Vernon; Mrs. Walter A. Beals, Mrs. C. R. Bordeaux, Olympia; Mrs. George Cropper, Shelton; Joel E. Ferris, Mrs. Charles Finucane, L. R. Hamblen, Spokane; Mrs. Howe Rushmore, Mrs. Corydon Wagner, Tacoma; Mrs. Fred Mason, Vancouver; Mrs. E. T. Adams, Wenatchee; and Mrs. O. R. Schumann, Yakima.

✓ ✓ ✓

The first issue of the University of Wisconsin's "Arboretum News" has been received in our office, and gives some interesting facts and figures about the Arboretum established at Madison in 1932, two or three years before work began on our own.

The area now includes more than 1200 acres of upland, lowland and marsh on three sides of Lake Wingra; preliminary work was done by the CCC between 1935 and 1940; the staff at the present time comprises a resident supervisor, two foremen and ten part-time men. Administration is under an Arboretum Committee appointed by the president of the University; the executive director is Prof. G. W. Longenecker, head of the Department of Landscape Architecture.

The principal objective is to provide an outdoor demonstration and research area for students of the biological sciences, and to maintain the whole area so as to preserve its amenities and uses for these purposes.

An annual budget is allocated for upkeep by the University Regents, and in addition "substantial numbers of public-spirited groups and individuals have made, and are continuing to make, gifts of money for purchase of land and of planting stock for it."

In many respects this closely parallels our own development and experience, and forms another link in the chain of arboreta across the country. Perhaps our two institutions may be able to cooperate and help one another in the future, by exchange of information, of plants, and in other ways.

Further interesting information concerning the comparatively new Los Angeles State and

County Arboretum is announced by its director, Russell J. Seibert: "The staff has been propagating thousands of plants from many parts of the world to test and to adorn the grounds of the Arboretum and eventually Southern California. About 10,000 plants are ready to be planted this fall and next spring. Several thousand trees and shrubs have already been planted this past year."

✓ ✓ ✓

Diseases of Holly in the Northwest

(Continued from Page Eighteen)

commercial growers since the presence of the dull green coating on the upper surface of leaves renders the foliage unsalable as cut holly. A species of *Protococcus* (green alga) is most frequently found in association with an unidentified imperfect fungus on holly leaf surfaces. This algal and fungal growth may be prevented by use of a chemical spray and by pruning trees to allow good air circulation.

The growth of sooty mold fungi (*Fumago vagans*, *Capnodium Footii*) on holly leaves is similarly not damaging to holly but renders foliage unsightly and unsalable. These fungi grow on "honey dew" from scale insects and form a dark green to black layer on the upper surface of holly leaves. Growth of sooty molds may be prevented by keeping holly trees free of insects.

A root-rot disease of holly, caused by an unidentified species of *Phytophthora*, has been reported, but pathogenicity has not been proven by inoculation trials.

Until a specific chemical spray program for control of holly diseases can be developed the following disease control suggestions are most applicable. (1) Select a planting site that is sufficiently open to allow moderate movement of air through a planting. If air movement is too restricted, humidity may remain high and favor disease initiation and surface growth of algae and fungi. (2) Prune trees sufficiently to allow air movement through the trees. (3) Prune out and destroy all cankered and diseased twigs to remove a potential source of infection.

ARBORETUM NOTEBOOK

This department is published for correspondence and pertinent comments by experienced growers on interesting plants and their culture. We solicit your questions but space limitation necessitates the publishing of only such answers as we deem of general interest.

Fragrant Winter Blooming Shrubs

What can be more pleasant than to walk into the garden on a dark and gloomy winter day and be greeted with a fragrance, a haunting sweetness that fills the air? Looking about one spies a plant of wintersweet, *Chimonanthus fragrans*. It is a bushy shrub growing to a height of 8 or 9 feet and is a native of Central China. The fragrant pale yellow flowers, stained a purplish wine color at the base, are borne freely on the bare branches throughout January and February. There is a form (var. *luteus*) having pure yellow flowers, which is both rare and beautiful.

The Indian plum, or oso berry, is the first of our native shrubs to bloom. The flowers appear in February and standing among other deciduous shrubs with its graceful racemes of greenish white fragrant flowers it thrills one as does the first robin—that harbinger of spring. The berries become apricot colored changing to blue-black.

Osmanthus armatus is a beautiful evergreen shrub from China which attains a height of 10 to 15 feet. It has thick holly-like leaves and small, creamy white, very fragrant flowers which are produced in autumn and continue on into the winter. There are several varieties of this genus, *O. Aquifolium*, *O. fragrans* and several others—all good. *O. Delavayi*, a neat growing dwarf shrub, covers itself with white waxy flowers in March and on into April.

The *Sarcococcas*, *S. humilis* and *S. ruscifolia*, are low-growing evergreen shrubs, 1 to 1½ feet in height, having narrow dark green pointed leaves. In late winter or early spring the stems are covered with creamy white fragrant flowers which are followed by black or red berries. Upon examination, the plants at this early date (October) are setting their bloom buds. They spread by means of underground runners and make a very satisfactory ground cover.

The witch hazels and certain of the bush honeysuckles may be classed among the early blooming shrubs having fragrant flowers. It is sometimes possible to find flowers on the American witch hazel, *Hamamelis virginiana*, as early as late October, and on *H. vernalis* early in the year. The Chinese species, *H. mollis*, is the most beautiful of the family. The deep yellow flowers cover the bare branches until early spring. Among the bush honeysuckles, *Lonicera fragrantissima* and *L. Standishii* open their fragrant white blossoms at the first breath of spring. These two, which are very similar, are the first of the honeysuckles to bloom. They push forth their white sweetly-scented blossoms from buds densely clustered on bare twigs.

Viburnum fragrans is the early flowering representative of this genus. Its small, deliciously scented, pink or white flowers in clustered bunches bloom from November throughout the winter. A hybrid of *V. fragrans* having larger and darker pink flowers has been developed in Great Britain and, while the plant is similar to the species, the flower is quite an improvement.

The earliest of the *Daphnes*, *D. Mezereum*, is

a small shrub growing to a height of about 3 feet and blooming in January and February. It is beautiful with its stiff little branches covered with small, intensely fragrant rosy-purple flowers. Planted with *Rhododendron mucronulatum*, a delightfully harmonious color combination is attained. *D. odora*, with its pink or white flowers, comes into bloom almost too late to be classified with the winter blooming shrubs. However, sprays from *D. odora* may be forced and thus much earlier flowers secured.

The early flowering *Camellias*, particularly *C. Sasanqua*, give us many types and colors of fall and winter blooms. These beautiful flowers have an odd earthy odor not at all unpleasant. The newer English hybrids of the Chinese *C. saluensis*, such as "J. C. Williams," "Mary Christian" and others, follow through the winter and will be invaluable for shady and sheltered corners; their flowers vary in color from pale to bright rose pink and in form from saucer to cup shaped. They flower most freely, even when young, and appear to be as hardy as most forms of *C. japonica*.

M. R. T.

✓ ✓ ✓

A few plants need special protection in cold winters, but the work and expense entailed makes one decide to take a chance that the season will be mild. If cold weather does come, the plants suffer serious setback and are sometimes total losses. While the covering should be light in weight it should be thick enough to protect from excessive snow and ice and be sufficient to prevent heaving of the soil.

Those who live in rural areas often have access to bracken, an ideal mulch, light, protecting and usually well rotted by spring. Chrysanthemums of the tender sort can be so mulched, placing slug bait around bases of plants before covering. Place fuchsias in a frame or in a protected place, sinking the pots an inch below soil level. Mulch quite thickly with leaves to the top of the plants, keeping the mulch down with a lath or two so that the leaves will not blow away. Of course, sawdust may be used and in that event, before forking into the ground in spring, add additional nitrogen (e.g. sulphate of ammonia) to help nature in providing plant food.

A very good disposition of waste material is the use of the branches of the Christmas tree, since our coldest weather is usually following the advent of the New Year. Prune off after the holidays and place where slight protection in the garden is needed or bolster up favorite shrubs to prevent a cold draft through them. By spring the needles drop off and the bare branches are easily burned. The dry branches are a real fire hazard if burned in a fireplace. Burn them out of doors.

S. M. B.

✓ ✓ ✓

There are many leafless branches in Mrs. John Blackford's winter garden, any one of which would add beauty and interest to gardens, large

or small. First of all is the *Prunus subhirtella* variety *autumnalis* with wide flung branches covered with exquisite pale pink blossoms from the first of November to April; then the hazel thickets of brown stems hung with catkins often coming soon after Christmas. The red stems of *Cornus occidentalis* have big bunches of white berries at the ends. The bright lively green of *Kerria* stems are low growing and brilliant on rainy days as well as when the sun shines.

Try bringing into the house a plant of alpine strawberries to add interest to the winter window garden. They will bloom and often they will produce fruits.

Magnolia grandiflora should be protected from a possible icy frost. Often, at times like this, big branches are broken from trees. Support of some kind should be provided. The long branches may be tied to the main trunk or stout sticks may be placed to keep them from breaking down.

G. T. D.

At the annual membership meeting of the Arboretum Foundation held October 29 in the Health Sciences Building on the University campus, the By-Laws of the Foundation, as revised and amended, were read, approved and accepted by the members present. The By-Laws are printed here, thinking they may be of interest to those members not present.

BY-LAWS
of
THE ARBORETUM FOUNDATION

Article I
Membership

1. Qualifications

Subject to the approval of the Executive Committee, any person, firm, association, partnership or corporation may become a member of the Foundation upon signing an application for membership and upon payment of the annual dues applicable to the class of membership applied for.

2. Classes of Membership

Membership shall be divided into seven classes with dues as follows:

Active	\$ 5.00
Contributing	10.00
Supporting	25.00
Sustaining	50.00
Sponsor	100.00
Life	500.00
Endowment	1,000.00

3. With the exception of Life and Endowment memberships all memberships shall continue for twelve months from date of acceptance of the application for membership and shall continue from year to year thereafter provided that the applicable dues are paid not later than sixty days after the commencement of the renewal membership year. Life and Endowment memberships shall be for life and no subsequent payment of dues shall be required.

4. Ex-Officio Members

The Governor of the State of Washington, the President of the University of Washington and the Mayor of the City of Seattle shall, by virtue of their offices, become members of the Foundation and shall not be subject to the payment of dues.

5. Termination

Any membership may be terminated by the

Board of Directors for any cause which it deems sufficient and shall be accomplished in this manner: The Board of Directors may, by a three-fourths vote of those present at any regular board meeting, request the resignation of any member. If such resignation is not received within thirty days after date of mailing the request for resignation, said member shall be deemed to have been dropped from membership.

Article II
Board of Directors

1. Composition

The Board of Directors shall be composed of one hundred members resident in the State of Washington of whom not less than seventy-five shall be residents of the Metropolitan Seattle area. They shall be elected by the members at the annual meeting of the members and shall hold office for the term of one year and until their successors are elected.

2. General Powers

The affairs of the Foundation and the corporate powers of the corporation shall be exercised by the Board of Directors, subject to the restrictions and provisions of the By-Laws. The Board may from time to time appoint, employ and discharge, define the duties and fix the compensation of such officers and employees as in the judgment of the Board shall be necessary or expedient.

3. Meetings

Regular meetings of the Board of Directors shall be held quarterly if practicable, at such times and places as may be determined upon the President. The President may call a special meeting of the Board on his own motion and must call a special meeting on the written request of five directors specifying the purpose for which said meeting is desired. Fifteen members of the Board of Directors shall constitute a quorum but a lesser number may adjourn any meeting from time to time.

4. Vacancies

Any vacancy occurring on the Board of Directors by reason of death, resignation, or for any other reason, shall be filled by appointment by action of the Executive Committee.

Article III
Officers

1. Qualifications

All such members as have been members in good standing for at least one year immediately preceding their election or appointment are eligible for election or appointment to office in this Foundation.

2. Officers Listed

The Officers of the Foundation shall be the President, three Vice-Presidents, a Secretary and a Treasurer. They shall be elected by the Board of Directors from among its membership at the annual meeting of the Board of Directors held in conjunction with the annual meeting of the members. All officers shall assume office at the close of the annual meeting of the members at which they are elected and shall serve until the next annual meeting of the members or until the election of their successors.

3. Vacancies

If, before the expiration of the term for which he was elected, the President dies, resigns, is removed or becomes disqualified, the First Vice-President shall succeed to the office vacated, with all the prerogatives and duties pertaining to the office as though he had been elected

President in the first instance. Vacancies created by the death, resignation, or any other cause of other officers shall be filled by appointment by the Executive Committee for the unexpired portion of the term.

Article IV *Duties of Officers*

1. The *President* shall be the executive head of the Foundation and shall perform such duties as shall be ordinarily incident to the office of President. He shall preside at all meetings of the Board of Directors, of the Executive Committee and of the members. He shall sign with the Secretary all documents and instruments required of the Foundation. He shall appoint all committees unless otherwise directed by the Board of Directors or Executive Committee.

2. *Vice-President*—The Vice-President shall assist the President in the discharge of his duties and shall perform such duties as shall be ordinarily incident to the office of Vice-President.

3. *Secretary*—The Secretary shall keep minutes of all meetings of the Board of Directors and of the Executive Committee, shall attend to all correspondence and promptly present all communications received to the Executive Committee. He shall perform such other functions as may be delegated to him from time to time by the Board of Directors or Executive Committee, as well as such functions as shall be ordinarily incident to the office of Secretary.

4. *Treasurer*—It shall be the duty of the Treasurer to receive all moneys due the Foundation from any source whatever, including membership dues, to keep correct accounts of all moneys received and contributions made, shall pay all bills and shall perform such other functions as may be delegated to him from time to time by the Board of Directors or the Executive Committee, and shall perform such other duties as shall be ordinarily incident to the office of Treasurer. He shall prepare each year a full and complete statement of all of the transactions of his office, showing the amounts received from any source whatsoever, the amounts disbursed, the balance on hand and shall submit the same to the Board of Directors at the annual meeting.

Article V *Meetings of Members*

The annual meeting of the members shall be held on the third Monday of October of each year, or within fifteen days thereof either before or after at the discretion of the President, for the election of Directors and the transaction of such other business as may come before it. Notice of the annual meeting shall be given by letter signed by the Secretary, to be mailed not less than ten days prior to the holding thereof at the address shown on the records of the Foundation. Twenty-five members shall constitute a quorum at any meeting. Special meetings of the members may be called at any time by the Executive Committee, and notice of any such special meeting shall be given to the members by mail posted at least ten days before such meeting, and such notice shall specify the purpose of the meeting.

Article VI *Committees*

1. *Executive Committee*

The Executive Committee shall consist of the President, the three Vice-Presidents, Secretary, Treasurer, the immediate Past President, the Chairman of the Arboretum Units and a Board

TREE SURGERY

Member National Shade Tree Conference

Topping, Removing, Power Saw Cutting
and Cavity Repair.

Work Guaranteed and Insured

HARRY A. SMITH

1839 N. 52nd EVERgreen 0847 Seattle 3, Wash.

member to be appointed by the President. A majority shall constitute a quorum and shall review and pass on all bills incurred by the Foundation and, except for routine expenses, must approve them before the Treasurer may pay them. It shall prepare and present a general budget for the ensuing year at the first meeting of the Board of Directors held following each annual meeting of the members. The Committee shall supervise and direct the Executive Secretary and other employees in the execution of their duties and shall have and exercise, except when the Board of Directors is in session, any and all powers of the Board of Directors and the management of the affairs and business of the Foundation.

2. *Nominating Committee*

At a meeting of the Executive Committee held more than thirty days preceding the annual meeting of the members, the President with the approval of the Executive Committee shall appoint a nominating committee composed of five members, which committee shall present a nominee for each office and director to be elected. Such nominations shall not be exclusive and additional nominations for any office may be made by any director.

4. *Standing Committees*

The President may appoint committees composed of any members of the Foundation for any purpose, including but not limited to the following Standing Committees: Bulletin, Finance, Membership, Unit Membership, Special Projects, General Publicity, Special Publicity, Speakers, Radio and Television, and University Liaison Committee. The President shall appoint a Chairman of each of the above committees, and each Chairman shall appoint the remaining members of the Committee. Each Chairman shall notify the Secretary of such appointments. Each committee, before taking any action in the name of or binding upon the Foundation shall report its proposed action to the Executive Committee and receive its approval thereof in advance.

Article VII *Audit*

The fiscal year of the Foundation shall end on September 30th of each year and the books of the Foundation shall be audited annually at the close of each year's business.

Article VIII *Official Publication*

The Official Publication of the Foundation shall be THE ARBORETUM BULLETIN in which shall be published all official Foundation notices, By-Law amendments and other transactions as may be directed by the Executive Committee.

Article IX *Amendments*

These By-Laws may be amended by a two-thirds vote of the members present at any regular or special meeting of the members.

BOOK REVIEWS

The Trees of New Zealand. Cockayne, L., and Turner, E. Phillips. New Zealand Forest Service, Government Printer, Wellington, New Zealand; 1950. 176 pp., illustrated.

Like the review of the European travel book "by a man who has never been there," this is a brief discussion of a handbook on New Zealand trees by one who has never had the opportunity of viewing the native forests of that region. But it required only a hasty glance at the pages of this book to awaken a dormant itch in the writer's feet—reminiscent of those days of long ago when New Zealand and its forests were "musts" on a proposed, but abortive, schedule of world travel.

This book is not new. The 1950 volume is a reprint of a revision of an earlier work originally published in 1928, primarily for the purpose of serving the needs of the Empire Forestry Conference. As a testimony to its interest and value is the fact that it has been reprinted several times to satisfy a constant public demand for a handy, authentic, readily understandable field guide to the forests of that region. Apparently New Zealanders find as great an interest in their forest flora as many of us do of ours. But, although it follows the plan of the original volume, this book (1950) is an enlarged and more complete presentation of the subject.

Obviously, the average American will find little of direct interest in this book. Few of the trees included bear any similarity to those of native American species, and only a few others can be associated with species introduced into gardens and parks here—at least as far as the Pacific Northwest is concerned. Yet, to those interested in the world's forest flora in general, it is perhaps to this fact that "The Trees of New Zealand" embodies its greatest value. This is particularly true of Chapter I which briefly outlines the character of New Zealand forests—composition, diversity, variations and reasons for those variations and the changes that have taken place in virgin forest cover since settlement of the islands by Europeans.

Chapter II, the major portion of the book, is devoted to numerous concise descriptions of native tree species, together with photographic illustrations of foliage, flowers, fruit and other features useful in their identification. Chapter III concerns itself with the commercially important species. In each case the quality of the wood is outlined and some indication of the uses to which it is most generally put is briefly given.

C. FRANK BROCKMAN

✓ ✓ ✓

Native Trees of Canada (4th Edition), Bulletin 61; Department of Resources and Development, Forestry Branch. (Ottawa, Canada 1953). \$1.50.

"Native Trees of Canada," published by the Forestry Branch of the Department of Resources and Development, is a reference guide of great interest for the resident of the northern states. It is seldom that a non-technical book of this nature comes to the attention of the amateur in the field of tree identification. The publication should be of like value to the professional botanist, arborist, nurseryman or park horticulturist.

Each page of text is excellently arranged with the official English common and the international scientific names followed by the common names of various localities. Each tree is described as to habit of growth, range, soil conditions and the type of forest environment of the species. There is a convenient listing of the tree parts, free of technical terms, with clear and concise descriptions. Corresponding to each page of text is a full page of black and white illustrations, with each detail superimposed upon a grid of one-inch squares. A range map for every tree covers not only Canada but the northern states, and within the front and back covers are excellent forest classification maps of Canada reproduced in full color. Besides an unusually good index, there are several items regarding genera, as well as many full-page illustrations in black and white and in natural color.

While this is not a new book but rather a reprint of the fourth edition, it is highly recommended to the reader as a comparative guide to be used with similar texts published in the United States. The price for the paper-bound volume is modest and within the reach of the average pocketbook.

H. T. ABBOTT
R. WOERNER

✓ ✓ ✓

The Great Oak Tree and Other Poems by Liberty Hyde Bailey, Chronica Botanica Co., Waltham, Mass.

A delightful booklet of poems by the author of the well-known three volumes, certainly much-thumbed-through for many years, "The Cyclopedia of Horticulture."

Under the interesting woodcut on the paper cover is inscribed: "A Keepsake, issued by the Editors of Chronica Botanica for the Members of the American Institute of Biological Sciences, attending the Cornell University Meetings, September 8-10, 1952."

Nicely arranged on the cream-colored pages and printed in attractive bronze-colored script, the lines of these lilting verses best bespeak their own joy:

*There are two worlds that I know full well,
The world of men and the petal bell.*

*A wonder-spell of mysteries
Contained in patient leaves of trees . . .*

*It's the tone of hills, the calm of the plain
The smell of the soil and the touch of rain;
'Tis a careful thought of the calm sweet grass
An abiding joy in the birds that pass . . .*

The publishers are graciously offering copies of the "Keepsake" free, on request.

GENE WEBB

✓ ✓ ✓

Botanists of the Pacific Railroad Surveys

(Continued from Page Five)

1854-60, 1873. Washington, 1855-61, 1874.

Suckley, George: *Natural History of Washington Territory and Oregon*, Bailliere Bros., 1860.

The Arboretum in Early Fall

(Continued from Page Two)

Claremont, California, and sundry other seeds of considerable potential value from England, Ireland, Florida (*Ilex ambigua*), and Japan.

Of books acquired we can report purchase of the following: Philip Miller's "Gardener's Dictionary," 2 vols., (1797-1807); C. S. Sargent's "Forest Flora of Japan," (1894); William Paul's "Rose Garden," 10th edition (1903); "Trees of New Zealand," Cockayne and Turner (1950 edition); "Native Trees of Canada" (Ottawa, 1950); "Flora of Venezuela" by J.

A. Steyermark (1951); "Wild Flowers of the Cape of Good Hope" by Rice and Compton (1951)—a varied and useful assortment.

Meetings and Lectures

A talk on new and unusual plants, illustrated by colored slides, was given to a joint meeting of the Washington State Nurserymen's Association and the local chapter of the American Association of Nurserymen by the Director on September 9th at Malmo's Nursery, Seattle. On the 18th he attended the meeting of the American Rhododendron Society in Portland, took part in a discussion on azaleas and showed slides of those growing in the Arboretum. Other illustrated talks on the Arboretum or its plants were given to Washington Park Boulevard Club by Mr. Hansen; to the Amateur Gardeners, Seattle; the Blueridge Orthopedic Unit, and to Arboretum Unit No. 16 by the Director, who also addressed the annual meeting of the Arboretum Foundation on October 29th, on the progress and present state of the Arboretum; on November 1st he visited Vancouver, B. C., to speak before the Vancouver Institute at the University on the history, aims and plant collections of this Arboretum; this lecture was also illustrated with slides.

Staff

Our secretary, Miss Maryann Fleetwood, left us early in September, after two and a half years service, for an improved position in another University department. She was replaced for a month by Mrs. Mabel Holte, until on October 20th Mr. James Mansfield was hired to fill the position.

The recorder and seed collector, Mr. Albert

Layritz Nurseries, Ltd.

(Established 1890)

VICTORIA, B. C.

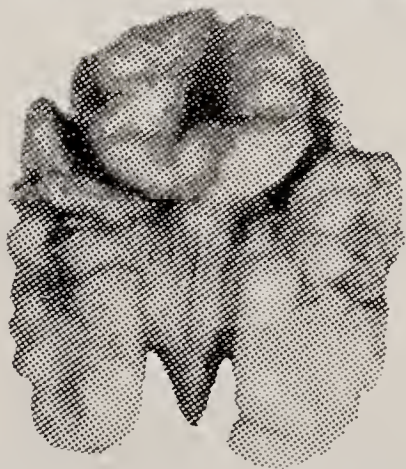
*We Specialize in
New and Rare Plants
Canadian Grown*

RHODODENDRONS—Over 300 varieties Newest English Hybrids and Species. Most of them Selected Forms, Award of Merit, or First Class Certificate.

Azaleas - Magnolias - Etc., Etc.

Write for Catalogue

SCHAFER—THE HARDY BUKOWINAN WALNUT



Plant
Patent
No. 494

Productive and early maturing.

Adapted to short seasons.

Stands severe winters.

Beautiful and profitable for the yard or commercial planting. Catalog.

LYNN TUTTLE NURSERY

BOX 186, CLARKSTON, WASHINGTON

PLANT WALNUTS FOR FUTURE SECURITY—EAT THEM FOR HEALTH

Howe, had to undergo a serious internal operation October 10, and has not yet (mid-November) returned to work, although making good progress. The foreman, Earl Brown, met with an unfortunate accident October 27th while turning a block of wood in a lathe, was hospitalized for a week, and only returned to work November 17th.

Two wage increases have been made for most staff members: the first, on September 1st, being anticipated normal increases for nine men in various positions; the second, November 1st, part of a general salary adjustment to certain University employees. This applied to ten men, and raised the basic laborer's wage to \$250.00 per month; in September 1949 it was \$200.00.

Miscellaneous

Weekly fifteen-minute radio talks by the Director are now being recorded at Radio Hall on the campus and sent out by the University station, KUOW, on Mondays at 7:30 p. m.; on Tuesdays at 8:45 p. m. by station KVI, Seattle.

Telephone inquiries for information have shown a marked rise this fall; the figures are, for September 1951, 51; September 1952, 93; October 1951, 58; October 1952, 110.

Mr. E. Marten has continued to make pictures for us as required; during these two months, 17 in color, 21 monotone, a number of the latter being of our various hollies, for illustrations and records. Mr. Hansen is completing a detailed map of the Magnolia area, showing the exact location and identity of each plant.

"AZALEAS"

Glenn Dale and Gable Hybrids
Asiatics and other Hybrids

"RARE PLANTS"

Including large collections of Asiatic
Maples, Hollies and Lilacs

Catalogued

KINGSVILLE NURSERIES

H. J. Hohman

KINGSVILLE, MARYLAND

PREVENT ROT WITH CUPROLIGNUM

Rot is expensive and
inconvenient when
it rots your

COLD FRAMES GARDEN STAKES
SEED FLATS TRELLISES
WINDOW HOTHOUSE
BOXES BENCHES
ETC.

*Where there is CUPROLIGNUM
there is NO ROT*

Sold by Most Lumber Yards and
Hardware Dealers

Manufacturers

Rudd Paint & Varnish Co.

SEATTLE

Sole Distributors RUDD & CUMMINGS

1608 15th Ave. W.

SEATTLE, WASH.

For GIFTS and FLOWERS
of Unmistakable Distinction

Crissey
FLOWERS • GIFTS

1329 Fifth Avenue

MAin 1100

Hollies in the Arboretum

(Continued from Page Seventeen)

where in this issue, and of Eastern Asia, although these are harder to find.

Young as the planting is, there are already some which are evidently of more value than others for garden use or ornament. Visitors can make their own choice, but a personal one would lean to the pyramidal-shaped, broad- and glossy-leaved form of the hybrid *I. alt-clarensis* known as *camelliaefolia*, the shining, spiny-pointed foliage of *I. cornuta*, the attractive bushes of *I. Aquipernyi*, a more compact hybrid between *I. Aquifolium* and the rather thin-habited *I. Pernyi* from Western China, and to the hardier Japanese *I. pedunculosa* with its spineless leaves and red berries on prominent stalks. Of this, however, like most hollies, it is necessary to have both male and female plants near one another if fruits are to be produced; the Arboretum group indicates this well in autumn and early winter.

Amongst smaller leaved kinds the neat, almost columnar shape of *I. Aquifolium* var. *myrtifolia* is very distinct in its section, as are its small leaves in size and form; so too is *I. yunnanensis* from Western China, stiffly upright with almost box-like foliage, whilst in the *I. crenata* clan the prize must surely go to var. *convexa* for its spreading, vigorous habit and glossy, convex little leaves—an excellent evergreen for foundation planting and thoroughly hardy with us. The two dwarfs here, var. *Helleri* and Kingsville, will have considerable value for rock gardens.

To summarize, we now have the nucleus of a good selection of hollies, most of which will be hardy here, and the promise of greater variety to come during the next few years as our young plants develop.

1 1 1

Hollies of the Southeastern States

(Continued from Page Fourteen)

and such exotic species as *I. Aquifolium*, *I. cornuta* and *I. latifolia*. But seeds of *I. Cassine*, *glabra*, and *myrtifolia*, if planted immediately after cleaning in January, will begin to germinate in three months or even less. Of these species, plants a foot or so high can be secured in a single season. This is also true

of *I. vomitoria*, but its seeds take about four months before they begin germinating.

As *I. coriacea* and *I. glabra* and sometimes *I. vomitoria* form masses from underground stems, they may be increased by dividing the clumps, even into single pieces, cutting them back severely and planting them. It is best to keep them for a year in a place apart from the garden that they may develop good root systems before setting in permanent places.

In budding, the usual T or shield method is used and the most satisfactory results are secured by inserting the buds just before the bark tightens in late summer or early autumn. Grafting is done in winter, the dormant season, and the whip graft is commonly used. Hollies in large numbers are grown from cuttings about four inches long, with all leaves removed except for two or three at the tips. The ends of twigs taken in late July, August and September, dipped in Hormodin No. 3 powder, inserted in coarse sharp sand and carefully watered and cared for give good results.

Pollination

Since hollies are dioecious, which is to say certain trees produce staminate flowers and others pistillate ones only, it is necessary that both sexes be close enough together that bees may transfer pollen. In many sections, holly trees native in the woods provide pollen, but in others it is necessary to plant staminate trees to make sure of fruit crops. If space is limited, as in a small property, two trees, one staminate, the other pistillate, blooming at the same time, may be planted in the same hole and allowed to grow up together.

Trees - Shrubs - Plants

"Everything for the Orchard, Home
and Garden"

Old Favorites—Plus the New and Unusual

Descriptive Catalog and Planting Guide on request.
Shipping and Delivery Season, Nov. 15 thru April 15

1 1 1

CARLTON NURSERY CO.

"Over Half a Century"

FOREST GROVE, OREGON

HARDY ENGLISH FERNS

Wide Selection

WRITE FOR PRICE LIST

Carl Starker Gardens

Jennings Lodge, Oregon

Helleborus corsicus, 50c ea.

(Green Flowered Hellebore)

Cyclamen neopolitanum

(Fall Blooming Hardy Cyclamen)

75c to \$5.00

2 yr. seedlings, 25c ea.

L. N. ROBERSON

1540 East 102nd Street

Seattle 55, Washington



Bunge Lumber & Hardware Co.

High Grade Peat Moss and All Types of Fertilizer

Including

Acid Fertilizer for Rhododendrons, Azaleas, Camellias, etc.

WEst 0022

9616 16th Avenue S.W., Seattle 6

Burien Yard, Glendale 1799

INDEX TO VOLUME XV (1952)

- Abbott, H. T., 4:27*
- Abelia, 1:26
- Abies procera, 4:8
- Aconitum Anthora, 2:26
- Adams, Robert, 4:15
- Agathis australis, 1:4
- Air Pollution, Injury to Trees and
Shrubs in the State of Wash-
ington as a Result of, 3:22
- Alaska Cedar, 4:8
- Alseuosmia macrophylla, 1:5
- Anacardium occidentale, 3:16
- Anemone Lyallii, 2:33
- Arboretum
 - Foundation By-Laws, 4:25
 - Gifts to the, 2:17
 - In Early Fall, 4:1
 - Map, 2:18, 19
 - Notebook, 1:26, 2:25, 3:28, 4:24
 - Spotlight
 - Cistus "Doris Hibberson," 2:9
 - Oxydendrum arboreum, 3:9
 - Pernettya mucronata, 4:10
 - Rhododendron pemakoense, 1:10
 - Spring in the, 2:1
 - Acquisitions, 2:2
 - Books, 2:3
 - Donations, 2:3
 - Plants, 2:2
 - Seeds, 2:2
 - Lectures, Tours and
Publications, 2:3
 - Miscellaneous, 2:27
 - Plantings, 2:2
 - Staff, 2:2
 - Summer in the, 3:1
 - Acquisitions, 3:2
 - Books, 3:2
 - Equipment, 3:2
 - Plants and Seeds, 3:2
- Exchanges and Distribution, 3:34
- Miscellaneous, 3:34
- Plantings, 3:2
- Staff, 3:34
- Weather and Flowering, 3:35
- The, Nov. 1951 to Feb. 1952, 1:1
- Acquisitions, 1:2
- Books, 1:3
- Plants, 1:3
- Seeds, 1:2
- Miscellaneous, 1:28
- Plantings, 1:1
- Plant Material Distributed, 1:3
- Staff, 1:3
- Talks and Lectures, 1:3
- Weather, 1:28
- Arbutus Unedo, 3:9
- Arctostaphylos, 1:14
- Andersoni, 1:17
- auriculata, 1:17
- canescens, 1:17, 30
- columbiana, 1:16, 17
- Cushingiana repens, 1:17, 29
- densiflora, 1:14, 16, 17
- franciscana, 1:14
- glandulosa, 1:17
- glauca, 1:30
- Hookeri, 1:14, 17
- Manzanita, 1:17
- mariposa, 1:17, 30
- morroensis, 1:30
- nevadensis, 1:17, 29
- nummularia, 1:16, 17, 29
- obispoensis, 1:17, 30
- pumila, 1:17, 29
- sensitiva, 1:17, 29
- silvicola, 1:30
- Stanfordiana, 1:17, 29
- Uva-ursi, 1:14, 17
- viscida, 1:17, 30
- Astelia, 1:5
- Astragalus, 4:5
- Atriplex, 4:4
- Atropa Belladonna, 2:4
- Avery, George S., Jr., 3:3
- Azalea occidentalis, 4:6
- Schippenbachii, 1:27
- Vaseyi, 1:27
- Baird, Spencer F., 4:3
- Ballard, Mrs. Page, 3:26
- Banghart, Edith H., 3:7
- Biekart, Henry M., 4:20
- Blechnum, 1:23
- Book Reviews
 - American Camellia Yearbook, 1951,
1:24
 - Azalea Handbook, The, 3:26
 - Gardener's Trouble Shooter,
The, 3:26
 - Great Oak Tree, The, 4:27
 - Lily Year Book, The, 1951-52, 2:22
 - New Zealand Trees and Flowers,
Our, 1:24
 - Nuttall's Travels into the
Old Northwest, 3:26
 - Rhododendron Handbook, The,
1952, 2:23
 - Rhododendron Year Book, The,
1951-52, 2:22
 - Rhododendrons, 2:23
 - Taxonomy of Vascular Plants, 1:25
 - Tree Identification,
A First Book of, 1:25
 - Trees of Canada, Native, 4:27
 - Trees of New Zealand, The, 4:27
 - Union Bay, The Life of a
City Marsh, 1:24
- Botanists of the Pacific
Railroad Surveys, 4:3

* Numbers refer to issue and page, i.e., 4:27 means No. 4, Page 27 of Vol. XV (1952)

Boughton, Gladys R., 2:7, 4:3
Boydia insculpta, 4:18
Brandt, Lester, 2:13, 3:14, 26
Brockman, C. Frank, 1:7, 3:10, 4:8,
4:27
— Photos by, 1:7, 3:10
Brooklyn Botanic Garden, 3:3
Bunge, Sally, 2:22
Buzard, James A., 1:24
By-Laws, Arboretum Foundation, 4:25

Calochortus Howellii, 4:7
Camellia "Cheerful", 1:26
— "J. C. Williams", 4:24
— "Mary Christian", 4:24
— saluenensis, 4:24
— Sasanqua, 4:24
Caperici, Mrs. J. F., 3:13
Caprodium Footii, 4:23
Ceanothus "Gloire de Versailles", 1:26
— thyrsoflorus, 4:6
Cedar, Western Red, 3:10
Cedrus libani, 2:5
Cephalotaxus Fortunei, 2:31
Cercis Siliquastrum, 1:27
Chamaecyparis nootkatensis, 4:8
Chimonanthus fragrans, 4:24
— — luteus, 4:24
Cistus "Doris Hibberson", 2:9
Clarke, Mrs. Casper, 1:24
Clematis, 1:11
— "Comtesse de Bouchard", 1:35
— "Duchess of Albany", 1:35
— "Duchess of Edinburgh", 1:34, 35
— fertilizer formula, 1:11
— Henryi, 1:35
— Jackmani, 1:35
— Lawsoniana, 1:35
— "Madame Edouard Andre", 1:11, 35
— "Marie Boisselot", 1:35
— montana, 1:11, 2:25
— "Nelly Moser", 1:34, 35
— "Ramona", 1:35
Cooper, Dr. James Graham, 4:3
Cornus Kousa, 2:25
— Nuttallii, 2:14
— occidentalis, 4:25
Cotinus americanus, 3:16
— Coggygria, 3:16
Cotoneaster acuminata, 3:8
— acutifolia, 3:8
— adpressa, 3:6
— bacillaris, 3:8
— bullata, 3:7, 8
— buxifolia vellaea, 3:6
— congesta, 3:6
— "Cornubia", 3:8
— Dammeri, 3:6
— Dielsiana, 3:8
— floccosa, 3:7
— foveolata, 3:8
— Francheti, 3:7, 8
— frigida, 3:7, 8
— Harroviana, 3:8
— Henryana, 3:8
— horizontalis, 3:6
— humifusa, 3:6
— integerrima, 3:8
— lactea, 3:8
— Lindleyi, 3:8
— lucida, 3:8
— melanocarpa, 3:8
— Meyeri, 3:8
— microphylla glacialis, 3:6
— moupinensis, 3:8
— multiflora, 3:8
— pannosa, 3:32
— Parneyi, 3:32
— rhytidophylla, 3:32
— salicifolia, 3:7, 32
— Simonsii, 3:7, 32
— tomentosa, 3:32
— "Tom Thumb", 3:6
— Wardii, 3:32
— Watereri, 3:32
— Zabeli, 3:32
Cotoneasters, In Praise of
— Dwarf, 3:6
— Larger Leaved, 3:7
Crocus chrysanthus, 3:28
— Imperati, 3:28
— speciosus, 3:28
— zonatus, 3:28
Cyathea medullaris, 1:5
Cypripedium californicum, 4:7

Dacrydium cupressinum, 1:4

Thirty-two

Daphne Mezereum, 4:24
— odora, 4:24
Deep, I. W., 4:18
Delphinium Menziesii, 4:7
— nudicaule, 4:7
Dicentra oregana, 4:7
Dogwood, The Pacific, 2:14
Douglas Fir, 1:6
— — at Dropmore, Bucks, England, 1:8

Earth Fill Around Trees, 1:20
Eglitis Maksis, 1:18
Endolepis, 4:4
English, Carl S., Jr., 3:12
— Edith Hardin, 3:12
Erythronium giganteum, 4:7
— Hendersonii, 4:7
Eucryphia cordifolia, 2:21
— glutinosa, 2:21
— lucida, 2:21
— Nymansay, 2:21
— Rostrevor, 2:21
Eucryphas, 2:21
Euonymus europaea, 1:11
Forsythia, 1:26, 2:31
Fortunearia sinensis, 2:31
Fragrant Winter Blooming Shrubs, 4:24
Fritillaria recurva, 4:7
Frye, Else M., 1:12
Fuchsia excorticata, 1:4
Fumago vagans, 4:23

Gardeners, Advice to Young,
— from an Old Hand, 1:12

Gardening Hints
— March, 1:26
— April, 1:26
— May, 1:27
— June, 2:25
— July, 2:25
— August, 2:25
— September, 3:28
— October, 3:28
Garden Tour in Scotland, 1:9
Gibbs, Mr. George, 4:3
Gleichenia Cunninghamii, 1:23
Gould, Charles J., 1:18
Grace, George D., 2:22
Graham, Donald G., 2:21
Gray, Asa, 4:3
Greville, Hon. Maynard, 1:8
— Photo by, 1:8
Griselinia littoralis, 1:4

Hamamelis mollis, 4:24
— — vernalis, 4:24
— virginiana, 4:24
Hanley, Mrs. E. B., 3:26
Hansen, R. J., 1:25
Hebe "Autumn Glory", 1:5
— epacridea, 1:5
— gigantea, 1:5
Hemitelia Smithii, 1:5
Hill, W. Ryland, 3:14, 15
Hitchcock, C. L., 1:25
Hoheria, 1:4
— populnea, 1:4
— — Osbornii, 1:5
— sextylosa, 1:4
Hollies at Wisley, Two, 4:15
— in the Arboretum, 4:17
— of the Southeastern States, 4:11
Holly, Diseases of, in the
— Pacific Northwest, 4:18
— Problem, A, 4:16
— Seeds at Arboretum,
— Germination of, 4:19
— The Propagation of American and
— English, for the Amateur, 4:20

Holo-discus discolor, 4:6
Hume, H. Harold, 4:11
Hydrangea "Amaranth", 2:36
— "Ami Pacquier", 2:36
— anomala, 2:10, 11
— arborescens, 2:10, 11, 21
— — grandiflora, 2:11
— aspera, 2:35
— "Attraction", 2:36
— Bretschneideri, 2:11, 13, 34
— "Candeur", 2:36
— cinerea, 2:11, 13
— "Domotoi", 2:35
— "Emile Mouilliere", 2:35
— "General Vicomtesse de Vibraye",
— 2:36
— "Gertrude Glahn", 2:36

— "Goliath", 2:36
— Hortensia, 2:35
— hortensis, 2:21
— integerrima, 2:10, 11
— involucrata, 2:34, 35
— "Jeanne d'Arc", 2:36
— "Kluis Superba", 2:36
— "La France", 2:36
— "La Marne", 2:36
— macrophylla, 2:13, 21, 34, 35
— — "Blue Wave", 2:35
— — "Lanarth White", 2:35
— — Mariesii, 2:35
— — — nigra, 2:35
— — "White Wave", 2:35
— "Mme. F. Mouilliere", 2:35
— "Mousseline", 2:36
— opuloides, 2:21
— paniculata, 2:10, 12, 13, 21, 34
— — floribunda, 2:12
— — grandiflora, 2:12, 21
— — praecox, 2:12
— "Parsi al", 2:36
— pekinensis, 2:34
— petiolaris, 2:10, 21
— quercifolia, 2:11, 13, 34
— radiata, 2:11, 21
— "Rosabella", 2:36
— Sargentiana, 2:13, 34
— strigosa, 2:13, 34, 35
— — macrophylla, 2:35
— — sterilis, 2:34
— "Ville de Vendome", 2:36
— villosa, 2:34, 35
— "Vulcan", 2:36
— "Westfalen", 2:36
— xanthoneura, 2:12, 34
Hydrangeas, 2:10
— in the Arboretum, 2:13
— Notes on the Pruning of, 2:21

Ihrig, Herbert, 2:24
Ilex ambigua, 4:11, 4:14
— Amelanchier, 4:11
— Aquifolium, 4:14, 15, 17, 18
— Beadlei, 4:11
— Buswellii, 4:11, 14
— Cassine, 4:11, 12, 17
— collina, 4:7
— coriacea, 4:11, 19, 30
— cornuta, 4:17
— crenata, 4:17
— cumulicola, 4:11, 12
— Curtissii, 4:11, 14
— Cuthbertii, 4:11
— decidua, 4:11, 17
— Fargesii, 4:15
— fragilis, 4:19
— glabra, 4:11, 12, 30
— Hookeri, 4:19
— insignis, 4:19
— Krugiana, 4:11, 12
— laevigata, 4:11, 14
— latifolia, 4:15, 17
— longipes, 4:11
— macrocarpa, 4:19
— macropoda, 4:19
— montana, 4:19
— monticola, 4:11
— myrtifolia, 4:11, 12, 19
— opaca, 4:11, 12, 14, 17, 20
— pedunculosa, 4:17
— Perardo, 4:19
— Pernyi, 4:17
— purpurea, 4:17
— serrata, 4:17
— verticillata, 4:11, 14, 17
— vomitoria, 4:11, 12, 14, 30

Juniperus chinensis, 3:6

Kerria, 4:25
King, Albert A., 1:23
Knightia excelsa, 1:4

Larix Lyallii, 2:23
Leptospermum scoparium, 1:4
— — flore-pleno, 1:4
— Keatleyi, 1:4
— rubra-pygmaea, 1:4
Lewisia Finchii, 4:7
— Howellii, 4:7
— oppositifolia, 4:7
Lilium candidum, 2:25
London's Chelsea Physic Garden, 2:4
Lonicera fragrantissima, 4:24
— Standishii, 4:24
Lupinus Lyallii, 2:23

- Lyall, Dr. David, Botanist of the International Boundary Survey, 2:7
- Macbride, Mrs. Philip, 1:25
- MacNeil, Mrs. Neil, 2:14
- Magnolia grandiflora, 1:13, 4:15, 25
- Mahonia Aquifolium, 4:6
- Malacothrix crepoides, 4:5
- Malmo, Beth Gilley, 1:11
- Mangifera indica, 3:16
- Manzanitas in the Arboretum, 1:17
- for Garden Use on the Pacific Coast, 1:14
- Marten, E. F., Photos by, 1:10, 2:9, 2:12, 14, 3:9, 4:10, 16, 19
- McClellan, George, 4:4
- McMinn, H. E., 1:14
- Photos by, 1:15, 16
- Meryta Sinclairii, 1:5
- Metrosideros collina, 1:5
- lucida, 1:5
- robusta, 1:5
- tomentosa, 1:5
- villosa, 1:5
- Meyer, Frederick G., 2:4, 3:16
- Michaud, L. J., 4:19
- Moore, H. Armitage, 2:13
- Mulligan, B. O., 2:1, 3:1, 4:1, 17, 19
- Photo by, 2:13
- Narcissus Triandrus albus, 2:26
- National Shade Tree Conference, Committee Report, 1:31
- Neillia longiracemorsa, 3:28
- Nelson, Harry E., 4:16
- New Zealand Plants of the Strybing Arboretum and Botanic Garden, San Francisco, 1:4
- Notes and Comment, 1:22, 3:24, 4:22
- Notothlaspi, 1:5
- rosulatum, 1:5
- Osmanthus Aquifolium, 4:24
- armatus, 4:24
- Delavayi, 4:24
- Ovulinia azaleae, 1:36
- Pellaea falcata, 1:23
- Penstemon, 3:28
- Lyallii, 2:33
- Pernettya mucronata, 4:10
- Pestalotia, 1:19
- Phlox adsurgens, 4:6
- speciosa, 4:6
- Phomopsis crustosa, 4:18
- Photographs of:
- Alaska Cedar (Chamaecyparis nootkatensis), 4:9
- Arctostaphylos sensitiva, 1:17
- Arctostaphylos Stanfordiana, 1:15
- Chelsea Physic Garden, London, 2:6
- Cherry Blossom Esplanade, Brooklyn Botanic Garden, 3:5
- Cistus "Doris Hibberston", 2:9
- Cranford Rose Garden, Brooklyn Botanic Garden, 3:4
- Douglas Fir, 1:7
- Douglas Fir at Dropmore, Bucks, England, 1:8
- Hydrangea, Oak Leaved (H. quercifolia), 2:12
- Hydrangea Sargentiana, 2:13
- Ilex Aquifolium myrtifolia, Ilex Aquifolium var. ferox, variegata, and Ilex Aquifolium var. recurva, 4:16
- Ilex Fargesii, 4:15
- Ilex glabra, 4:13
- Ilex Pernettya, Ilex Aquipernyi, and Ilex Aquifolium, 4:19
- Ilex vomitoria, 4:13
- Oxydendrum arboreum, 3:9
- Pernettya mucronata, 4:10
- Rhododendron pemakoense, 1:10
- Sumacs, 3:19
- Western Dogwood in Arboretum, 2:14
- Western Red Cedar, 3:10
- Phytophthora, 4:23
- cactorum, 1:19
- cinnamoni, 1:19
- Pieris Forrestii, 1:26
- japonica, 3:9
- Pine, Sugar, 1:9
- Western Yellow, 1:9
- Pinus Jeffreyi, 1:9
- Lambertiana, 1:9
- monticola, 4:8
- ponderosa, 1:9, 3:23
- Pistacia vera, 3:16
- Plant Names, 1:27, 2:26, 3:28
- Plants from the Siskiyou, Rare and Useful, 4:6
- Podocarpus, totara, 1:4
- Poison Ivy, 3:16
- Oak, 3:18
- Primula Auricula, 1:27
- Juliae, 1:26
- Protococcus, 4:23
- Prunus subhirtella autumnalis, 4:25
- Pseudopanax crassifolia, 1:5
- ferox, 1:5
- Lessonii, 1:5
- Pseudotsuga macrocarpa, 1:8
- taxifolia, 1:6
- Quercus petraea, 4:15
- robur, 4:15
- Raoulia eximia, 1:5
- Rhododendron arboreum, 3:15
- Augustinii, 1:27, 3:15
- bullatum, 3:33
- Disease Problems in Washington, 1:18
- Fortunei, 2:31
- glaucum, 1:27
- hippophaeoides, 3:33
- indicum, 2:25
- intricatum, 3:33
- "King George", 1:27
- lutescens, 3:15
- mucronulatum, 4:24
- neriiflorum, 3:33
- pemakoense, 1:10
- ponticum, 1:18
- Societies, 1:22
- Souliei, 1:27
- Williamsianum, 1:27
- yunnanense, 1:27
- Rhododendrons, 3:15
- Alpine, from Seed, 3:13
- Raising from Seed, 3:12
- Ribes sanguineum, 3:28
- Rhus aromatica, 3:18
- chinensis, 3:20
- choriophylla, 3:27
- copallina, 3:20, 27
- coriaria, 3:18
- diversiloba, 3:17, 18
- glabra, 3:16, 21, 27
- — laciniata, 3:21
- integrifolia, 3:21
- lanceolata, 3:20, 27
- laurina, 3:21
- Michauxii, 3:21
- microphylla, 3:27
- ovata, 3:21
- Potaninii, 3:20
- punjabensis, 3:21
- radicans, 3:16, 18
- succedanea, 3:20
- sylvestris, 3:20
- trichocarpa, 3:20
- trilobata, 3:18
- — serotina, 3:18
- typhina, 3:21, 27
- vernicifera, 3:16
- vernix, 3:20
- virens, 3:27
- Roberson, Frances Kinne, 3:6
- Rosa arnoldiana, 2:28
- bracteata, 2:16
- foetida, 2:26
- — persiana, 2:16
- macrantha, 2:29
- Regelia, 2:16
- Roxburghii, 2:16
- rubrifolia, 2:16
- rugosa, 2:15, 28, 30
- — "Agnes", 2:16
- — albiflora, 2:15
- — albo-plena, 2:16
- — altropurpurea, 2:15
- — "Belle Poitevine", 2:16
- — "Blanc Double de Coubert", 2:16
- — "Carmen", 2:28
- — "Carminetta", 2:16
- — "Carnation Rose", 2:29
- — "Conrad F. Meyer", 2:28
- — "Delicata", 2:16
- — "Dr. Eckener", 2:16
- — "Enchantress", 2:28
- — "F. J. Grootendorst", 2:29
- — "Frau Dagmar Hartopp", 2:16
- — fimbriata, 2:29
- — "General Jacqueminot", 2:28
- — "Gloire de Dijon", 2:28
- — "Golden King", 2:16
- — "Grootendorst Supreme", 2:29
- — "Hansa", 2:16
- — "Hildenbrandseck", 2:28
- — Its Varieties and Hybrids, 2:15
- — "Lady Curzon", 2:29
- — micrugosa, 2:16
- — "Mme. Georges Bruant", 2:29
- — "Mme. Norbert Levavasseur", 2:29
- — "Mrs. Anthony Waterer", 2:28
- — "Nova Zembla", 2:28
- — "Parfum de l'Hay", 2:28
- — Paulii, 2:29
- — — rosea, 2:29
- — "Persian Yellow", 2:16
- — "Phoebe's Frilled Pink", 2:29
- — "Pink Grootendorst", 2:29
- — repens, 2:29
- — "Rosaie de l'Hay", 2:16
- — rubra, 2:15, 29
- — "Ruskin", 2:29
- — "Sanguinaire", 2:28
- — "Sarah Van Fleet", 2:28
- — scabrosa, 2:15
- — "Schneezweg", 2:16
- — "Sir Thomas Lipton", 2:29
- — "Sombreuil", 2:29
- — typica, 2:15
- — "Vanguard", 2:28
- — "Victor Hugo", 2:29
- Sarcococca humilis, 4:24
- ruscifolia, 4:24
- Scase, R. P., Photo by, 4:15
- Scheffer, Theo. H., 2:17
- Seattle Rhododendron Society, 1:22
- Shaw, Charles Gardner, 3:22
- Shrubs, Fragrant Winter Blooming, 4:24
- Skunk Bush, 3:18
- Smith, Mrs. Harry O., 4:6
- Spartium junceum, 2:25
- Suckleya Suckleyana, 4:4
- Suckley, Dr. George, 4:3
- Sumac, Chinese, 3:20
- European, 3:18
- Evergreen Leaved, 3:21
- Fragrant, 3:18
- Ill scented, 3:18
- Japanese, 3:20
- — Woodland, 3:20
- Laurel, 3:21
- Lemonade Berry, 3:21
- Michaux's, 3:21
- Potanin's, 3:20
- Shining, 3:20
- Smooth, 3:21
- Staghorn, 3:21
- Sugar Bush, 3:21
- Texas, 3:20
- — Evergreen, 3:27
- Sumacs, Cultivation of, 3:27
- Relatives of Poison Ivy, 3:16
- Synthyris rotundifolia Sweetseri, 4:6
- Tacoma Rhododendron Society, 1:22
- Taylor, Bryan, 2:21
- Thomas, G. S., 2:15
- Thuja occidentalis, 3:10
- plicata, 3:10, 4:8
- Torrey, John, 4:3
- Trees and Shrubs, Injury to, in the State of Washington as a Result of Air Pollution, 3:22
- Earth Fill Around, 1:20
- of the Pacific Northwest, Native, 1:6
- Vaccinium Vitis-idaea, 1:32
- Vancouveria chrysantha, 4:7
- planipetala, 4:7
- Verse, Cosmos and Microcosmos, 1:23
- Viburnum fragrans, 4:24
- opulus, 2:10
- Viola chrysantha, 4:7
- cuneata, 4:7
- Hallii, 4:7
- Vista Garden at Coulee Dam on the Columbia, 2:17
- Walther, Eric, 1:4
- Wax Tree, 3:20
- Webb, Gene, 4:27
- Western Red Cedar, 3:10
- Woerner, R., 4:27
- Woodwardia radicans, 4:7
- Wysong, Noel, 1:20
- Young, Roy A., 4:18

THE ARBORETUM BULLETIN

Published by the
Arboretum Foundation
University of Washington
Arboretum
Seattle 5, Washington

MRS. CONNER E. GRAY
4851 EAST 39TH
SEATTLE, WASH.

Sec. 34.66 P. L. & R.
U. S. POSTAGE PAID
SEATTLE, WASHINGTON
Permit No. 413

POSTMASTER: If addressee has removed, please notify us of new address on Form 3547, postage for which is guaranteed.



*A Tree is
a Living Thing*
PROTECT IT!